BIBLIOGRAPHY OF INVESTMENT AND OPERATING COSTS FOR CHEMICAL AND PETROLEUM PLANTS JANUARY–DECEMBER 1958

BY SIDNEY KATELL, JOHN H. FABER, AND JOHN W. DOUGLAS

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CONTENTS

	Page
Introduction	1
Acknowledgments	2
Abstracts	2
Subject index	47
Author index	51

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BIBLIOGRAPHY OF INVESTMENT AND OPERATING COSTS FOR CHEMICAL AND PETROLEUM PLANTS JANUARY - DECEMBER 1958[1]

by

Sidney Katell[2], John H. Faber[3], and John W. Douglas[4]

INTRODUCTION

The present report, a continuation of the series of Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, is concerned with articles published from January 1958 through December 1958. The periods covered in previous reports are as follows:

January 1930 - August 1948	I. C. 7516
September 1948 - June 1952	I. C. 7705
July 1952 - June 1954	I. C. 7751
July 1954 - December 1956	I. C. 7847
January 1957 - December 1957	I. C. ____

The following sources were used to obtain the references to and the abstracts of the published articles included in this report:

1. Bureau of Mines Information Circulars.
2. Bureau of Mines Reports of Investigations.
3. Chemical Engineering.
4. Chemical Engineering Progress.
5. Coal Age.
6. Coal Utilization.
7. Cost Engineering.
8. Industrial and Engineering Chemistry.
9. Nucleonics.
10. Oil and Gas Journal.
11. Petroleum Engineering.
12. Petroleum Refiner.
13. World Oil.

1/ Work on manuscript completed January 1959.

2/ Supervisory Chemical Engineer, Bureau of Mines, U. S. Department of Interior, Morgantown, W. Va.

3/ Chemical Engineer, Bureau of Mines, U. S. Department of Interior, Morgantown, W. Va.

4/ Physical Science Aid (W.A.E.), Bureau of Mines, U. S. Department of Interior, Morgantown, W. Va.

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Most articles are concerned with cost data. However, several discuss various aspects of cost estimating procedure or operational plant data.

As noted in Items 60 and 225, several other groups prepare periodical bibliographies which are more limited in scope. The amount of overlap in the contents of the various bibliographies is insignificant and all serve a useful purpose.

ACKNOWLEDGMENTS

The guidance and assistance of the following people are acknowledged: Dr. L. L. Hirst, Chief, Branch of Coal Gasification and the members of the Process Economics Evaluation Staff, Branch of Coal Gasification.

ABSTRACTS

A

1. ABBOTT, M. D., ARCHIBALD, R. C., AND DORN, R. W. Improve Cat Cracking Feed Stocks. Oil Gas Jour., vol. 56, No. 20, May 19, 1958, pp. 144-152.

   Capital and operating costs of hydrogenating catalytic cracking feed will vary with capacity, operating pressure, required space velocity, and construction standards. Required pressure and space velocity will, in turn, vary with properties of feed.

   Generally, capital costs are in range of $100 to $200 per daily barrel of capacity. Direct operating cost, which includes catalyst, labor, maintenance, and utilities is less than 10 cents per barrel of feed.

2. ADAMS, ERNESTINE. Deep Well Increase 28%. Petrol. Eng., vol. 30, No. 3, March 1958, pp. B-21 - B-30.

   Operators drilled 199 holes 15,000 feet or below in 1957 at a cost of $148 million. Average cost of drilling per foot in 1957 was $46.25. The record deep well, 22,570 feet, cost about $113 a foot, and it has been reworked twice at a substantial added cost.

3. _____. Industry Leaders Preview 1958. Petrol. Eng., vol. 30, No. 1, January 1958, pp. A17-A25, A28.

   Contains estimated 1958 expenditures for drilling and producing of oil, manufacturing, transportation, and marketing of products.

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4. ADAMS, NELLSON R., AND KERSTEN, RALPH C. A Fresh Look at Crude-Oil Values. Oil Gas Jour., vol. 56, No. 8, Feb. 24, 1958, pp. 125-131.

Crude-oil prices are slated to rise in future because crude-oil production costs have risen more rapidly than have crude-oil prices since World War II. Costs have soared as result of increased wildcatting and greater depth of wells found necessary to produce proved areas - coupled with the higher wage and material costs that have been sustained by industry in general.

5. ALBRIGHT, MELVIN A. Computer Gives Best Splitter Design. Petrol. Refiner, vol. 37, No. 12, December 1958, pp. 111-114.

Estimated cost of a pentane splitter is presented and compared to the calculated results attained by means of a computer. Article contains utility cost data.

6. ALEXANDER, W. H., AND BRADLEY, R. L. Would a CO Boiler Pay Off in Your Plant? Petrol. Eng., vol. 30, No. 7, July 1958, pp. C-15 - C-18.

Contains charts which will help you figure whether CO boiler would pay off in your plant. One specific chart shows basic data on installed boiler costs.

7. ALFRED, ROBERT, AND SCHROEDER, H. L. Methods and Practices for Producing Crushed Granite, Campbell Limestone Co., Pickens County, South Carolina. Bureau of Mines Inf. Circ. 7857, 1958, 24 pp.

One of series being published by Bureau of Mines on methods and practices used in mining and preparing crushed stone for market. With specific reference to the operation of the Liberty quarry and plant of the Campbell Limestone Co., the maintenance, supervision, labor, and power requirements are presented.

8. APITZ, C. R. Cheaper Power With Gas Turbines. Oil Gas Jour., vol. 56, No. 5, Feb. 3, 1958, pp. 88-92.

Gas turbines of the 1,000 hp. category can be installed at a price of $170-$200 per brake-hp. depending upon cycles and auxiliaries required. As for operating costs, it is estimated that gas-turbine cost is about 30 percent less than cost of operating and maintaining gas-engine-driven plant of same horsepower.

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9. ARENDT, JOHN J., AND SAVOY, JOHN. Data Logger Tested in Pilot Work. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 175-178.

Shows how Sohio's operation has increased accuracy, reduced data-collection time, and lowered operating costs by using automatic data logger.

10. ATKINS, GEORGE T., AND FELPS, NEWTON O. Initial Exchanger Costs Versus Maintenance. Petrol. Refiner, vol. 37, No. 11, November 1958, pp. 267-270.

Maintenance costs of a large group of refinery shell and tube heat exchangers covering a two-year period have been tabulated to find an economical balance between initial cost and future maintenance.

11. ATKINSON, J. E., AND BAKER, G. G. New Oil Base Mud Trims and Improves Drilling. Petrol. Eng., vol. 30, No. 6, June 1958, pp. B-30 - B-34.

In a 2,918 feet interval below a long and cased-off salt section Shell Oil Co. has cut mud bill by $13.45 per foot, reduced sloughing, and safely landed two liners through hazardous zones. Table showing comparative mud costs for drillings at different levels is also listed.

B

12. BACH, NORMAN G. How to Get More Accurate Plant Cost Estimates. Chem. Eng., vol. 65, No. 19, Sept. 22, 1958, pp. 155-159.

Ratio estimating is a simplified approach to preliminary capital cost estimates. One can come up with a low cost, fast, fairly accurate cost estimate by using new Monsanto Chemical ratio cost factors.

13. BARAL, W. J., HENDRICKS, G. E. W., AND DAMSKEY, L. R. What It Costs to Operate a Unifiner. Petrol. Refiner, vol. 37, No. 10, October 1958, pp. 133-135.

Contains direct operating cost data and tables on four typical Unifining units. Comparisons are made with other catalytic refining processes.

14. BARNEBEY, H. L., AND DAVIS, W. L. Costs of Solvent Recovery Systems. Chem. Eng., vol. 65, No. 26, Dec. 29, 1958, pp. 51-55.

Contains cost data which permits quick, approximate estimate of capital costs and economic benefits of activated carbon solvent recovery systems.

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15. BARTELS, CHARLES R. Cost Trends and Controls in Pharmaceuticals. Chem. Eng. Prog., vol. 54, No. 3, March 1958, pp. 59-61.

Article offers a rudimentary method for estimating effect of continued production on manufacturing costs of pharmaceuticals. Series of graphs included show cost trends of a product.

16. BAUMAN, H. CARL. Accuracy Considerations for Capital Cost Estimation. Ind. Eng. Chem., vol. 50, No. 4, April 1958, pp. 55A-58A.

Shows how American Cyanamid Co. can code and subject its cost information to statistical sampling techniques to give accurate cost estimates.

17. _____. Analytical Approach to High Accuracy "Short-Cut" Estimation of Fixed Capital Projects. Ind. Eng. Chem., vol. 50, No. 6, June 1958, pp. 65A-67A.

Cost of putting a product on market is sum of raw material, labor, factory overhead, and profit margin. Article shows how factors can be developed which will reduce estimation of total cost to simple formula.

18. _____. Fixed Capital Cost Estimation From Charts and Curves. Ind. Eng. Chem., vol. 50, No. 11, November 1958, pp. 61A-63A.

A commodity record card, compiled on data based on past experience, can be a valuable cost estimating tool in fixed capital cost estimating.

19. BEAN, THERON W. What Does a Refinery Estimate Cost? Petrol. Refiner, vol. 37, No. 7, July 1958, pp. 163-166.

Preparations of a typical 40,000 barrel-per-calendar-day refinery estimate can involve up to 12,000 man-hours. A breakdown of the various elements of the estimate are included.

20. BECHTOLD, IRA C. Complete Automation of a Process Plant. Oil Gas Jour., vol. 56, No. 23, June 9, 1958, pp. 115-121.

By using computers in feedback control loop of process plant as actual operating instrument working in conjunction with the controllers, plant may be made to approach optimum cost for material being processed and operating expenses involved by repeated checking by computer and setting up new conditions more closely approaching optimum.

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21. BETHANCOURT, RAOUL. Well Workovers Will Pay Big Dividends. Petrol. Eng., vol. 30, No. 13, December 1958, pp. B-36 - B-48.

Describes the method used by the Sun Oil Co. to establish the costs of work over projects. Included is table showing classification of wells, the cost items involved, and a summary of costs.

22. BINNING, ROBERT C., AND JAMES, FRANK E. Permeation: A New Way to Separate Mixtures. Oil Gas Jour., vol. 56, No. 21, May 26, 1958, pp. 104-105.

Gives information concerning development of permeation as means for separating liquid mixtures. This development may find application in both petroleum refinery and chemical plant problems. Table is given comparing costs of Membrane permeation to Hexane azeotroping for isopropanol drying processes.

23. BIRCHARD, RALPH. Indexes Aren't Infallible! Cost Eng., vol. 3, No. 2, April 1958, pp. 60-62.

Shows that the more closely components of a cost index resemble those in a particular construction estimate the better that index will be for revising today's estimate in 1959 or 1960.

24. BOLMER, R. L., AND GREENLEE, B. B. Raising With a Suspended Work Cage at the Irene Shaft, Leadville, Colorado. Bureau of Mines Inf. Circ. 7868, 1958, 27 pp.

Describes a unique method by which Resurrection Mining Co. safely and efficiently completed a 622-foot vertical raise at its Irene shaft near Leadville, Colorado. Use of new method resulted in lower overall costs. Tables giving detailed distribution of raising costs included.

25. BOTSET, DR. HOLBROOK G., AND FULTON, PAUL F. Selective Plugging of Input Wells. World Oil, vol. 146, No. 1, January 1958, pp. 152-156.

Operators of water input wells in Bradford, Pennsylvania have saved more than $3,727,000 in water costs as well as reducing lifting costs by selectively plugging water input wells in area.

26. BRADY, B. T., AND RORSCHACH, R. L. Curves for Rapid Estimation of Gasoline Plant Investment. Petrol. Eng., vol. 30, No. 4, April 1958, pp. C-7 - C-8.

Shows 3 cost curves which give quick estimation of gasoline plant investment.

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27. BROMBERG, IRWIN. Estimate Cost of Compression Plants. Petrol. Refiner, vol. 37, No. 5, May 1958, pp. 225-226.

Discusses breakdown of costs one can expect to pay for compressor station. Several kinds of compressors are represented in cost estimate.

28. _____. Estimate Cost of Fractionation Systems. Petrol. Refiner, vol. 37, No. 12, December 1958, pp. 141-143.

Explains steps to take to estimate cost of fractionation systems. Tables are included.

29. BUCHANAN, R. L. Process Evaluation From Lab to Plant. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 146-150.

Gives step-by-step example of application of process evaluation from research laboratory through engineering to completed plant. A typical comparative cost analysis, including both capital and operating costs, is shown for two methods of producing a similar product.

30. BUCHTLER, HAROLD R., AND DUNN, JAMES F., JR. Cut Costs With Cost Accounting. Petrol. Refiner, vol. 37, No. 7, July 1958, pp. 167-171.

Discusses how Petro-Tex Chemical Corp. keeps cost records to maintain budgets and operating efficiencies.

31. BUCK, B. O., AND LEITCH, ANGUS R. S. CO_2 Removal From Natural Gas. Oil Gas Jour., vol. 56, No. 38, Sept. 22, 1958, pp. 99-104.

Operating costs involved in hot potassium carbonate plant for the removal of CO_2 from 25 million standard cubic feet per day of natural gas are given for various CO_2 inlet concentrations.

32. _____. Try Gas Treating With Hot Carbonate. Petrol. Refiner, vol. 37, No. 11, November 1958, pp. 241-246.

Contains essentially same information as Abstract 31.

33. BULLOCK, ROBERT L. How Interstate Uses Deep Ground Beds to Protect Bare Pipelines. Oil Gas Jour., vol. 56, No. 49, Dec. 8, 1958, pp. 94-101.

Deep ground beds have made cathodic protection of bare pipelines in high-resistance soil economical. Contains a rundown on design, installation, performance, and cost of new type deep ground bed employing graphite rods and coke breeze backfill.

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34. CALLAHAN, J. L. Service Pipeline Looks at Pump Stations. Oil Gas Jour., vol. 56, No. 37, Sept. 15, 1958, pp. 170-175.

Discusses uses of electric and diesel stations, showing developments leading toward a modern station. A comparison of maintenance and operating costs of modern electric and diesel station is also included.

35. CARLSON, G. ARNOLD. Continuous Mixers. Cost Eng., vol. 3, No. 2, April 1958, pp. 44-48.

Presents tables concerning cost of continuous mixers which are generally propelled by single- or twin-rotor machines.

36. _____. Horizontal Ribbon-Type Batch Blenders. Cost Eng., vol. 3, No. 1, January 1958, pp. 4-8.

Contains various cost tables concerning horizontal ribbon-type batch blenders.

37. CHEMICAL ENGINEERING. CE Cost File.

Presents a series of graphs relating the size of chemical plant equipment to the cost of the particular equipment item.

Ref.No.	Vol.	No.	Date	Page	Item
37-1	65	12	June 16, 1958	187-188	Evaporators, kneaders
37-2	65	14	July 14, 1958	158	Glass-lined tank and kettles, iron kettles
37-3	65	16	Aug. 11, 1958	151	Floating-head heat exchangers
37-4	65	18	Sept. 8, 1958	141-142	Storage tank, motor reducer-starter
37-5	65	20	Oct. 6, 1958	141	U-tube heat exchangers
37-6	65	23	Nov. 17, 1958	166	Finned-tube exchangers
37-7	65	24	Dec. 1, 1958	123	Floating-head heat exchangers
37-8	65	25	Dec. 15, 1958	181	Fixed-tube sheet heat exchangers
37-9	65	26	Dec. 29, 1958	63-64	Fixed-tube sheet heat exchangers

38. _____. Equipment Cost Indexes.

These indexes are compiled quarterly by Marshall and Stevens, Inc., but the indexes are listed monthly. The monthly references are as follows:

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Ref. No.	Vol.	No.	Date	Page
38-1	65	2	Jan. 27, 1958	82
38-2	65	4	Feb. 24, 1958	143-144
38-3	65	6	Mar. 24, 1958	86
38-4	65	8	Apr. 21, 1958	80
38-5	65	10	May 19, 1958	84
38-6	65	12	June 16, 1958	80
38-7	65	13	June 30, 1958	76
38-8	65	14	July 14, 1958	96
38-9	65	15	July 28, 1958	156
38-10	65	16	Aug. 11, 1958	178
38-11	65	17	Aug. 25, 1958	158
38-12	65	20	Oct. 6, 1958	184
38-13	65	25	Dec. 15, 1958	214

39. CHEMICAL ENGINEERING. Equipment Costs Continue Upward. Vol. 65, No. 4, Feb. 24, 1958, pp. 143-144.

Presents graphs and tables showing how equipment costs rose steadily during 1957, again forcing yearly averages to new highs.

40. _____. Flash Oxidation Slashes Metallic Oxide Costs. Vol. 65, No. 25, Dec. 15, 1958, pp. 78-80.

Explains new flash oxidation furnace and secret gaseous catalyst from technical core of simplified continuous process for making zinc oxide and ammonium sulfate. Process reduces capital investment by 80 percent, and cuts production cost by 40 percent.

41. _____. Ozone Counters Waste Cyanide's Lethal Punch. Vol. 65, No. 6, March 24, 1958, pp. 63-64.

A two-stage contacting system has been developed to oxidize cyanide. This major new installation proves that ozone's top performance is matched by favorable costs.

42. _____. Pack in Low-Cost Capsules. Vol. 65, No. 1, Jan. 13, 1958, pp. 88-90.

A Pathus-Labour installation at Grasse, France turns out a calcium alginate capsule for shipment to Africa at a total production cost of $6.60 per 12,000. In France a capsule machine costs $1,200, f.o.b. factory, for an assembled 10-20 nozzle unit.

43. _____. Plastic Metals Minimize Plant Shutdowns. Vol. 65, No. 22, Nov. 3, 1958, pp. 150-154.

Presents costs of new plastic-metal materials which are being used to repair corroded process equipment.

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44. CHEMICAL ENGINEERING. Searchers Seek to Open Literature Logjam. Vol. 65, No. 3, Feb. 10, 1958, pp. 84-86.

High-speed computers can make up to 5,000 complete computer searchings per minute. Dow Chemical rents time on a number of IBM machines for few minutes each week - on experimental basis. Machines rent for about $7-8 per minute. Thus, for less than $100 per month computers breeze through work which might cost a firm much more time and money.

45. _____. Tankcars Cut Shipping Costs for Crystals. Vol. 65, No. 3, Feb. 10, 1958, pp. 80-82.

Tankcars are winning an increasing share of dry crystal haulage. Bulk prices and solution unloading trim user costs.

46. CHEMICAL ENGINEERING PROGRESS. Nuclear Heat to Distill Saline Water? Vol. 54, No. 2, February 1958, pp. 87-89.

Reviews exhaust system of low-energy level as basis for economical saline water distillation. A heavy, water-moderated and cooled reactor combines with evaporator to produce lowest cost water. Cost picture for this combination is:

	Water ¢/1,000 gal.
Capital costs	
a. reactor plant	14.5
b. distillation plant	26.8
Fuel costs (total energy)	4.7
Operation and maintenance costs	
a. reactor plant	7.0
b. distillation plant	10.0
Total water cost	63.0

47. _____. Optimum Design Capacity. Vol. 54, No. 1, January 1958, pp. 56-59.

One of major items which enters into choice of design capacity of new production unit is operating cost. Concern centers on cost factors which are dependent on production rate. These are capital, labor, and utilities costs. Four cost tables included.

48. _____. Saline Water Conversion...Big Business of Future? Vol. 54, No. 4, April 1958, pp. 160-162.

Discusses conversion of saline water to fresh water, different methods used, and wide range of production costs.

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49. CHRISTOPHER, DAN. More Piping PSI for Your Dollar. Petrol. Refiner, vol. 37, No. 3, March 1958, pp. 143-146.

Presents graph showing relative cost of piping material. Shows a unique method of determing most economical piping material for any pressure and temperature.

50. COAL AGE. Cost Control. Vol. 63, No. 4, April 1958, pp. 78-85.

Special report on ability to control cost, which essentially means ability to keep cost at minimum - postively and continuously. No actual cost figures were given, but charts and graphs show various methods of cost control.

51. _____. Cost Control. Vol. 63, No. 10, October 1958, pp. 86-90.

Describes how a coal mining company, through the industrial-engineering approach, attained modern cost control. Benefits, in addition to increased rewards for management and supervisory personnel, include an increase of 40 percent in tons per man and a cut of 25 percent in mining cost in less than 3 years.

52. _____. Hanna Developments Cut Shaft-Sinking Costs at Ohio and West Virginia Mines. Vol. 63, No. 6, June 1958, pp. 106-110.

Shows overall cost picture of new technique developed by Hanna Coal Co. for sinking mine shafts. System includes boring blastholes with a vertical over-burden drill, blasting in 9-foot lifts, and removing broken rock with clamshell on surface.

53. _____. Improved Bucket Teeth Cut Costs. Vol. 63, No. 6, June 1958, pp. 114-115.

Explains how change from manganese-steel teeth to welded teeth have resulted in longer digging life and lower maintenance costs for dragline buckets at Northern Illinois mine, Willmington (Ill.).

54. _____. New Mine Cars Cut Haulage Cost 33%. Vol. 63, No. 10, October 1958, pp. 108-114.

Safer, smoother, and faster transportation at lower costs are top gains from big 262-cubic foot mine cars especially tailored to fit 34-inch coal. A 33 percent reduction in haulage costs and an ensuing 5 percent cut in overall mining costs are outstanding benefits resulting from these new cars.

55. COAL UTILIZATION. Coal-Rail-Power Combine Goes "On The Line". Vol. 12, No. 12, December 1958, pp. 35-37.

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Presents the costs and the design details of a new power plant located at Carbo, Virginia.

56. COAL UTILIZATION. 10 Important Questions. Vol. 12, No. 12, December 1958, pp. 19-30.

Contains authoritative answers to ten questions from leaders in power and coal industries in effort to define size and shape of things to come. Includes both the capital and operating costs of power plant. Illustrates relationship between costs and both size and station heat rate.

57. _____. The Crucial Problem of Costs. Vol. 12, No. 10, October 1958, pp. 20-22.

Article starts from the basic concept that coal-burning boiler plants using up to 20,000 tons of coal per year (up to about 150,000 pounds per hour of steam) require one operator per shift. When coal is delivered by truck, no additional labor is required. When coal delivery is by rail, unloading of coal can be done for about $0.275 per ton, or around a cent per million B.t.u. Adequate coal-handling equipment, ash-handling equipment, and car-loading equipment must be provided at reasonable initial cost. This cost can be limited to $0.58 per ton, so that the total labor costs plus fixed cost do not exceed $0.86 per ton -- or about three cents per million B.t.u. Tables showing the maximum allowable extra labor and initial cost of handling systems are also contained in this article.

58. COHEN, KARL. Charting a Course for Nuclear Power Development. Nucleonics, vol. 16, No. 1, January 1958, pp. 66-70.

A large part of our electric power will be nuclear in origin by 1980. A rational approach to a long-term reactor economics is proposed in article stressing role of realistic material and capital costs. Tables included.

59. COPULSKY, WILLIAM, AND CZINER, RUDOLF. Dynamic Cost Estimating. Ind. Eng. Chem., vol. 50, No. 9, September 1958, Part I, pp. 73A-75A.

Explains how long-range evaluation of cost trends for a plant can be a valuable managerial tool.

60. COST ENGINEERING. Cost Literature, 1957. Vol. 3, No. 1, January 1958, pp. 22-39.

Abstracts of articles containing cost information which were published in 1957.

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61. COX, JOHN, AND SCOTT, ROBERT W. Additional Mud Storage At Nominal Cost. World Oil, vol. 147, No. 7, December 1958, pp. 105-107.

Kerr-McGee Oil Industries Inc. converted an integral structural part of their Rig No. 46 to a 500-barrel capacity reserve pit at a nominal cost of $12,000.

62. CRONAN, C. S. Cake Indicator Automates Filter. Chem. Eng., vol. 65, No. 1, Jan. 13, 1958, pp. 98-100.

Durco-Enzinger's cake thickness indicator boosts productivity per dollar invested, improves product quality, and reduces operating costs.

63. _____. Horizontal Fractionator Looms as Potential. Chem. Eng., vol. 65, No. 3, Feb. 10, 1958, pp. 76-78.

Aiming at lower cost, high quality fractionation of close-boiling, heat sensitive liquids, a system that opens door to more economic processing of 1,000 to 10,000 pounds per hour of feed material has been developed. Estimated cost is less than $100,000 for a 5,000 pound-per-hour plant based on experience with present unit handling 1,250 pounds per hour of tall oil.

64. CROOKS, W. R. Combustion-Air Conditioning: - A Passing Fad? Oil Gas Jour., vol. 56, No. 42, Oct. 20, 1958, pp. 84-89.

Evaluates place of combustion-air conditioning in production of power with particular reference to use of natural gas as fuel in internal-combustion engines. Discusses the relative costs of 10,000 hp. compressor station versus engine models and presents the annual fuel cost of the 10,000 hp. station.

65. CUNNINGHAM, B. G. Maintenance of Salt Water Disposal Lines. World Oil, vol. 146, No. 2, Feb. 1, 1958, pp. 77-78.

Acid solvents remove scale deposits and keep lines at high operating efficiency. About 15 tons of scale were removed from a salt water disposal line, 12,500 feet in length. The four- and six-inch transit pipe was so badly scaled that salt water could not be disposed of as rapidly as it was produced. Line was restored to full capacity in 26 hours at about 1/4 cost of laying a new one.

D

66. DALZELL, R. CARSON, DAVIS, W. KENNETH, GOODMAN, CLARK, AND STAEBLER, ULYSSES M. AEC's Fuel Program. Nucleonics, vol. 16, No. 8, August 1958, pp. 78-81.

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Major components of fuel cycle costs for a nuclear reactor are: (1) Costs of the fissionable material and cost of other ingredients in fuel elements; (2) costs of fabricating materials into fuel elements; (3) charges for chemical processing of fuel elements after removal from reactor: and (4) cost of waste processing and disposal.

67. DECKER, ARTHUR L. Improved Mechanical Seals for Nonlubricating Hydrocarbons. Oil Gas Jour., vol. 56, No. 1, Jan. 6, 1958, pp. 93-96.

Pump-maintenance costs can be reduced. Improved mechanical seals for particular group of nonlubricating hydrocarbon services in petro-chemical plant resulted in 33 percent reduction in pump maintenance costs for battery of pumps involved.

68. DeLORENZO, J. F. Lining Technique Halves Vessel Cost. Chem. Eng., vol. 65, No. 26, Dec. 29, 1958, pp. 70-74.

For corrosive service consider lining with hard-to-fabricate Hastelloy. Large vessels can be lined by welding, and it is much cheaper than solid-alloy equipment.

If made from solid Hastelloy, cost would be -	$45,000
But if made from steel, Hastelloy lined -	22,000
Savings	$23,000

69. DERSHOWITZ, A. F., AND McENTEE, H. R. Joint Products and Byproducts. Chem. Eng., vol. 65, No. 26, Dec. 29, 1958, pp. 61-62.

Cost systems are vital to health and growth of any industry. With this article and a knowledge of process alternatives, you can help provide more objective standards for allocating product costs.

70. DRESSLER, RUSSELL G., AND JOHANSON, ARNOLD G. Water Reservoir Evaporation Control. Chem. Eng. Prog., vol. 54, No. 1, January 1958, pp. 66-69.

Twenty million gallons of water is being saved in United States as result of new monomolecular film techniques for cutting down evaporation from lakes and reservoirs. Total cost of saving water is shown in this table.

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	Cost/acre ft. water saved	% of Total Cost
Fatty alcohol	$3.96	88
Amort. of equipment	.25	5
Maintenance and Miscellaneous	.10	2
Power	.09	2
Labor	.08	2
Consulting, Engineering	.04	1
Total	$4.52	100

E

71. EATON, J. B. $750,000 Saving in Compressor Stations. Oil Gas Jour., vol. 56, No. 10, Mar. 10, 1958, pp. 176-179.

Texas Gas Transmission Corp. has developed and put into operation a unitized drive system that has saved about $750,000 on compressor-station expansion and building costs since original installation in 1952. These unitized drive compressors can be installed at approximately $5,000 per engine.

72. EICKMEYER, A. G. Costs Favor Hot Carbonate Process. Chem. Eng., vol. 65, No. 17, Aug. 25, 1958, pp. 113-116.

Hot carbonate process for removing acid constituents from gas streams is now commercially operating in at least seven plants in United States alone. Hot carbonate process uses available pressure of acid gas more effectively than monoethanolamine process. Recent information about its comparative economics included.

73. EVANS, FRANK. 6 Steps to Better Drafting Practices. Petrol. Refiner, vol. 37, No. 8, August 1958, pp. 133-148.

Considers various ways to cut design and drafting costs with time savers.

F

74. FAIR, J. R., BOLLES, W. L., AND NISBET, W. R. Ethylene Purification - Demethanization. Chem. Eng. Prog., vol. 54, No. 12, December 1958, pp. 39-46.

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Discusses the various demethanization techniques and the relative operating and capital costs of 120,000,000 pound-per-year units.

75. FATTU, EMIL. Crushing and Grinding Costs at Bunker Hill Co. Cost Eng., vol. 3, No. 1, January 1958, pp. 15-18.

Detailed costs given for operations at mill and smelter crushing plant.

76. FINK, FREDERICK W. Materials for Corrosion Control. Ind. Eng. Chem., vol. 50, No. 1, January 1958, pp. 129A-131A.

Titanium sheet for prevention of corrosion is now available at about $10 to $13 per pound. Zirconium sheet, which is somewhat more expensive, is just becoming available for uses other than those in nuclear energy.

77. FLORINE, R. E., AND DEDERT, W. G. Planning Economical Kraft Mill Evaporators. Chem. Eng. Prog., vol. 54, No. 4, April 1958, pp. 64-68.

Reviews economical benefits from planned and unplanned expansion. Careful planning can assure operation efficiency, and thus provide for future expansion.

78. FONDRK, V. V. Figure What an Ejector Will Cost. Petrol. Refiner, vol. 37, No. 12, December 1958, pp. 101-105.

Presents data which will help size pre-condenser and intercondensers, estimate ejector costs, and predict steam and water consumption.

79. FRANKLIN, HARRY L., AND MILLER, W. DOYLE. Production Practices in Venezuela Are Based on Bigger Volumes Than Those in U. S. Oil Gas Jour., vol. 56, No. 8, Feb. 24, 1958, pp. 132-138.

Production costs have varied considerably since end of World War II. Production has increased from 323 million barrels annually to over a million barrels. Included are typical cost figures in Venzuelan operations and detailed cost figures for Venzuelan drilling.

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G

80. GARRETT, DONALD E., AND ROSENBAUM, GERHARD P. What Crystallizers Cost Today. Chem. Eng., vol. 65, No. 16, Aug. 11, 1958, pp. 138-140.

Contains rough preliminary estimates of crystallizer costs. They show the following:

1. Estimated costs for mechanical crystallizers.
2. Costs of forced-circulation and growth crystallizers.
3. Examples of "Krystal" crystallizer costs.
4. 1958 crystallizer costs for quick estimates.
5. 1958 crystallizer costs for final decisions.

81. GILFOIL, W. S., AND MONGAN, E. L. Process Evaluation. Chem. Eng. Prog., vol. 54, No. 3, March 1958, pp. 62-64.

Close and continuing co-operation is necessary between research, development, production, and engineering groups for satisfactory design of facility to manufacture new product. Problems to be solved which result in savings are discussed.

82. GOEKEN, R. J. Workover Costs Reduced With Concentric Tubing Tool. World Oil, vol. 146, No. 4, March 1958, pp. 135-144.

Use of 3/4-inch tubing as a workover tool resulted in net savings of $552,155, based on conventional rig costs of 71 jobs completed by Gulf Oil Corp. in Louisiana Delta. Discusses procedures, low costs, and success of new tool.

83. GORDON, J. A. How This Plant Went Automatic. Petrol. Refiner, vol. 37, No. 4, April 1958, pp. 136-139.

Total cost of replacing 3 boilers with direct-fired oil heater to heat rich absorption oil to higher temperature than that required for still column, and to generate agitation steam with hot oil in new steam generator is $92,300. Breakdown into major cost items is also given.

84. GORE, W. L. How to Improve Estimate Accuracy. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 142-145.

Shows how proper appraisal of uncertainties in estimates can save time and money when making cost studies.

85. GRAY, DR. GEORGE R. Chemicals in Drilling Mud. Oil Gas Jour., vol. 56, No. 50, Dec. 15, 1958, pp. 90-98.

Discusses why, where, and when chemicals are added in drilling-mud industry plus a look at some figures on drilling costs at various wells.

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86. GRIMM, RICHARD T. Pressure Leaf Filters. Cost Eng., vol. 3, No. 4, October 1958, pp. 96-102.

Presents useful guide for estimating initial cost, installation, operating and maintenance costs for pressure leaf filter installations.

87. GUTHRIE, VIRGIL B. For 1958 - Moderate Gains in Demand. Petrol. Eng., vol. 30, No. 1, January 1958, pp. C-7 - C-10.

One dollar per gallon is being mentioned as price for boron-type liquid fuel now being produced semi-commercially by Olin Mathieson Chemical Corp. at Niagara Falls.

88. GUTOFF, REUBEN. Cost Reduction - A Program That Works. Chem. Eng. Prog., vol. 56, No. 9, September 1958, pp. 74-76.

Shows how a profit-oriented budget should counter-balance the profit-threatening influence of rising costs of raw materials, supplies, and services. Following five elements will bring this budget into focus:

1. Establishment of cost reduction budgets.
2. Determining cost reduction policies.
3. Organization of a cost reduction team.
4. Stimulation for maximum individual participation.
5. Measurement of performance.

H

89. HACKNEY, JOHN W. What Affects Estimate Accuracy? Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 128-134.

Presents 5 important factors in estimating projects capital costs. They are: Project definitions, forecasting job conditions, estimating method used, cost records, and estimator skill.

90. HALSELL, GRACE. Sahara Oil Begins Moving to Market by Pipeline. World Oil, vol. 146, No. 2, Feb. 1, 1958, pp. 97-99.

A 20-inch pipe running distance of about 600 miles from Hassi-Messaoud field to port of Bougie will cost an estimated 50 billion francs ($100 million). This is all part of future plan to pipe oil from Hassi-Messaoud and Edjeb fields to French seacoast.

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91. HAMILTON, BENJAMIN P., JR. How to Reduce Costs. Petrol. Eng., vol. 30, No. 5, May 1958, pp. E-1 - E-5.

Contains key factors and basic rules for successful cost reduction program. A check list for cost reduction program is included in article.

92. HAMMOND, G. P., AND KINSTLER, R. C. Let Photography Speed Your Drafting. Chem. Eng., vol. 65, No. 10, May 19, 1958, pp. 161-165.

Discusses combining field photography with conventional drafting techniques to produce photodrawings at lower cost.

93. HAND, W. E. From Flowsheet to Cost Estimate. Petrol. Refiner, vol. 37, No. 9, September 1958, pp. 331-334.

A series of factors for various items of process equipment which is useful in making capital cost estimates suitable for process evaluations is given.

94. HARDWICK, T. J., AND NEJAK, R. P. Radiation in the Petroleum Industry. Chem. Eng. Prog., vol. 54, No. 2, February 1958, pp. 72-73.

From most optimistic evaluation of industrial process utilizing radiation, process cost for nonchain reactions is about $5 per pound.

95. HARDY, WALTER L. Cost Analysis in New Plant Construction. Ind. Eng. Chem., vol. 50, No. 1, January 1958, pp. 121A-122A.

Explains that it is necessary, when building new plant, to have cost-oriented engineering thinking.

96. HIGGINS, I. R., ROBERTS, J. T., HANCHER, C. W., AND MARINSKY, J. A. Preparing Uranium Tetrafluoride by Ion Exchange and Electrolysis. Ind. Eng. Chem., vol. 50, No. 3, March 1958, pp. 285-292.

A preliminary cost estimate indicated in this article that an Excer plant converting 6,000 tons of uranium per year (20 tons per day, 300 days per year) from diuranate ore concentrate to high-purity uranium tetrafluoride would cost about 35 cents per pound of uranium. This cost does not include taxes, profits, or development costs.

97. HITCHNER, L. S. Pesticides. Ind. Eng. Chem., vol. 50, No. 1, January 1958, pp. 51A-54A.

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In 1957 chemical industry spent an estimated $15,000,000 as compared to $8,000,000 as recently as 1950 to find better pesticides. United States Department of Agriculture and other federal government agencies are spending an additional $4,500,000 to $5,000,000 a year which brings total to about $20,000,000. Cost of bringing single new pesticide to market has increased also. It is estimated that it now costs $1,500,000 to $1,750,000 to develop and thoroughly test new pesticide to meet both competition and the high standards set forth by United States Department of Agriculture and Federal Food and Drug Administration.

98. HOLLISTER, HAL L., AND BURINGTON, ARTHA JEAN. Pricing Enriched Uranium. Nucleonics, vol. 16, No. 1, January 1958, pp. 54-57.

Gives analysis of separation-plant economics which yields published U price scale, explains how to calculate equivalent amounts of U at different enrichment, and leads to simple method for estimating reactor fuel burnup cost.

99. HOPKINS, A. S. J. Tipple Dust Control. Coal Age, vol. 63, No. 2, February 1958, pp. 154-156.

Contains data showing how automatically controlled spray system using chemical additive for greater effectiveness solves tipple dust control problem at cost of less than 4 mills per ton.

100. HOWARD, GEORGE C., FLICKINGER, DON H., FAST, C. R., AND EVANS, R. B., III. Hydraulic Fracturing. Oil Gas Jour., vol. 56, No. 21, May 26, 1958, pp. 81-88.

Presents information concerning procedure used for determining optimum treatment design for deriving maximum profit from hydraulic fracturing.

101. HUBER, T. A. The Challenge In Oil Field Mechanical Development. Petrol. Eng., vol. 30, No. 8, July 15, 1958, pp. B-22 - B-31.

New and revolutionary developments are needed in equipment and techniques to halt and turn the upward trend in oil producing cost per barrel. Various cost graphs are contained in article.

102. HURST, R. E., ROLLINS, J. T., AND STEWART, H. A. Fresh Water Fracturing Can Cut Treatment Costs. World Oil, vol. 147, No. 1, July 1958, pp. 117-123.

Use of fresh water as fracturing fluid for new and old wells completed in high salt content crude oil formations in the Permian Basin has resulted in cut in treatment costs.

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103. JASON, HERBERT O. Asphalt Demand 137 Million Barrels in 1960-67? Petrol. Eng., vol. 30, No. 3, March 1958, pp. C-8 - C-11.

Average cost per mile of asphalt pavements as compared to cement pavements on superhighways is $500,000 - $1,000,000 for asphalt and about $1,400,000 per mile for concrete.

104. JEFFUS, D. M., JR., AND JONES, V. T., JR. Salvaged Mud Saves $813,670. Oil Gas Jour., vol. 56, No. 15, Apr. 14, 1958, pp. 119-121.

A reclamation system was installed at Timbalier Bay by Gulf Oil Corp. at a cost of $42,952. Great savings in overall mud costs have been obtained from use of system. Since operations commenced with each new component of reclamation system, net total savings of $813,670 has resulted.

105. JELEN, F. C. Cost Comparisons by Capitalized Cost. Petrol. Refiner, vol. 37, No. 1, January 1958, pp. 195-201.

Explains how to use capitalized cost for making cost comparisons.

106. _____. How Inflation Affects Cost Analysis. Petrol. Refiner, vol. 37, No. 8, August 1958, pp. 101-106.

Describes how to accommodate inflation in comparative cost analysis, and it allows for inclusion of income tax as well.

107. _____. Remember All Three in Cost Analyses. Chem. Eng., vol. 65, No. 2, Jan. 27, 1958, pp. 123-128.

Discusses combined effect of return, income tax, and inflation. They should all be considered in preparation of comparative cost analysis.

108. JENKINS, GEORGE F. Let's Shift the Emphasis. Chem. Eng. Prog., vol. 54, No. 2, February 1958, pp. 63-65.

Points out that on cost of steam basis, nuclear reactor is competitive with about $7.00 coal at about 95 percent load factor and less than $0.06 oil. The 95 percent load factor is generally a requirement in the chemical industries. Stresses need for arriving at selection of most economical and successful type of reactor within next ten years.

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109. JOHNSON, A. C. Exploration, Development, and Costs of the Stormy Day Tungsten Mine, Pershing County, Nevada. Bureau of Mines Inf. Circ. 7854, 1958, 9 pp.

One of a series relating to methods and costs of equipping and developing mining properties in United States. Report describes exploration, development, and exploitation methods, and summarizes costs at Stormy Day Tungsten Mine, Pershing County, Nevada.

110. _____. Shaft-Sinking Methods and Costs at the T. L. Shaft, Eureka Corp., LTD, Eureka, Nevada. Bureau of Mines Inf. Circ. 7835, 1958, 25 pp.

One of a series of articles relating to methods and costs of equipping and developing mining properties in United States. Article describes shaft-sinking methods and costs at the T. L. Shaft of the Eureka Corp., LTD, Eureka, Nevada.

111. JONES, H. E., AND KJELLMARK, E. W., JR. How Computers Aid Economic Studies. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 151-163.

Develops a series of basic equations which may be used to establish both investment and operating costs by means of a computer program.

K

112. KALLMAN, DONALD, AND BRENNAN, JOHN E. Blending Versus Reenrichment. Nucleonics, vol. 16, No. 7, July 1958, p. 101.

Compares costs between 2 alternative ways of removing fission products and Pu from burned-out fuel so as to reuse it. The 2 ways are: (1) Return it to diffusion plant to be reenriched to its initial value, and (2) blend highly enriched U with depleted material to get proper enrichment.

113. KASTEN, PAUL R., AND AVEN, RUSSELL E. Fuel Costs in Batch- and Continuous-Processed Homogeneous Reactors. Ind. Eng. Chem., vol. 50, No. 2, February 1958, pp. 171-177.

A series of equations and tables showing how, as inexpensive fuel processing facilities become available, continuous processed reactors will have a lower fuel cost.

114. KATELL, SIDNEY. The Economic Outlook for Pipeline Gas From Coal. Coal Age, vol. 63, No. 9, September 1958, pp. 116-118.

Contains comparative costs of various processes for converting coal to pipeline gas.

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115. KATELL, SIDNEY, AND JOYCE, THOMAS J. Determining Process Unit Operating Costs. Cost Eng., vol. 3, No. 4, October 1958, pp. 103-108.

Presents one method of estimating process unit operating costs. Labor costs, material costs, overhead, and capital charges are estimated and tabulated for each unit, and total estimated operating cost for each process unit is determined. Short discussion of methods of distributing overhead costs is given. Table included showing effect of return on investment on production costs.

116. _____. How to Allocate Process Steam Costs. Chem. Eng., vol. 65, No. 5, Mar. 10, 1958, pp. 152-154.

Gives some simplified methods of calculating unit costs of steam when source is waste heat recovery units or multiple extraction from turbines. These methods enable one to make comparisons of unit costs of steam obtained from various sources.

117. KERN, DONALD Q., AND SEATON, RALPH E. How to Save Money on Exchangers. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 135-141.

Discusses what to consider when purchasing exchangers and the cost-saving procedures.

118. KINNEY, GENE T. Who Picks Up the Tab for LACT? Oil Gas Jour., vol. 56, No. 20, May 19, 1958, pp. 192-196.

Details items that enter into cost of a LACT unit. Points out that investment in a LACT unit by a pipeline company must be paid out by savings in gaging costs based on average production for a 10 year period.

119. _____ AND RESEN, LARRY. Offshore Pipelines--And What It Costs to Build Them. Oil Gas Jour., vol. 56, No. 23, June 9, 1958, pp. 108-109.

Estimated cost of building offshore pipelines is given for various companies in Gulf of Mexico.

120. KREBS, THOMAS M. Selection of Furnace Tubes for Refinery and Petrochemical Service. Petrol. Eng., vol. 30, No. 3, March 1958, pp. C-36 - C-44.

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Cost is important in selecting heater tubes, but prices are influenced by many factors such as length, quantity, and specification. To provide engineers with a guide to preliminary estimation, relative cost ratios must be prepared for common heater tube steels.

121. KUHN, W. E. Where Are Petrochemicals Headed? Oil Gas Jour., vol. 56, No. 9, Mar. 3, 1958, pp. 95-99.

Petrochemical production will increase 100 percent between now and 1965. Approximately 50 percent of petrochemical products come from byproducts of refinery operations. Cost of these byproducts are tied directly to future prices of crude, natural gas, and LPG.

L

122. LAMMERS, H. B. Incremental Cost of Burning Coal in Utility Generating Stations. Coal Utilization, vol. 12, No. 8, August 1958, pp. 20-24.

Contains tables showing operating and maintenance costs of burning coal in utility electric generating stations. Tables indicate that further reduction of operation and maintenance costs are possible.

123. LANE, JAMES A. Where We Stand Today. Nucleonics, vol. 16, No. 1, January 1958, pp. 46-47.

Economic problems of nuclear power are proving almost as refractory as engineering problems once seemed. The two are closely related of course, but today questions concerning nuclear power are more often cast in terms of cost. From available data, one can predict that nuclear power is still a possibility in not-to-distant future at very low cost.

124. LEIGHTON, J. C. New Bit Designs Contribute to Lower-Cost Coal Cutting. Coal Age, vol. 63, No. 5, May 1958, pp. 108-110.

Extensive tests indicate that negative rake angle on Carbide-tipped cutter bits contributes to lower-cost coal cutting.

125. LOCHER, W. E., OLSON, A. E., AND NIBLEY, P. P. Unattended Turbine Stations. Oil Gas Jour., vol. 56, No. 14, Apr. 7, 1958, pp. 125-132.

Installed cost of unattended gas turbine pumping unit placed in operation by Trans-Arabian Pipe Line Co., including communication and portable shop installations, is about $1,500,000 or $250 per brake hp. on basis of expected annual average output of 6,000 brake hp.

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126. LOCKER, GEORGE R. Fracturing 89 Percent Successful. Oil Gas Jour., vol. 56, No. 2, Jan. 13, 1958, pp. 94-101.

A gross expenditure for 37 Fullerton Clearfork Unit oil wells totaled $249,888 for average of $6,754 per well. Expenditure has been repaid and profit after payout of $63,280 was realized. Current additional monthly income derived from fractional expenditure is $27,727.

127. LUKES, JAMES J. The Development of a Perchloroethylene Process. Chem. Eng. Prog., vol. 54, No. 3, March 1958, pp. 75-78.

Discusses highlights of development of process for perchloroethylene by placing emphasis on program planning, cost distribution, and man power requirements.

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128. McCORD, H. B., AND ENQUIST, MELVIN. Cut Sludge-Handling Costs. Oil Gas Jour., vol. 56, No. 44, Nov. 3, 1958, pp. 101-102.

Formerly, sludge at Sante Fe Springs Waste Water Disposal Co. had to be trucked away at a cost of $800 per month. Due to new system which sharply reduces amount of sludge that must be trucked away, the sludge-trucking bill is only about $150 monthly. A portion of savings in trucking is offset by higher sludge-treating costs. But since some benefit is had from recirculating chemicals used in primary treatment of waste water, overall operating costs have been cut $500 per month.

129. McGHEE, ED. Faster Drilling Rates. Oil Gas Jour., vol. 56, No. 23, June 9, 1958, pp. 91-96.

To curb spiraling costs, offshore drillers are investigating all items which enter into drilling costs. Article discusses these various cost items and cost reduction improvements which are being accomplished.

130. _____. What We Know About LACT -- And Why We Like It. Oil Gas Jour., vol. 56, No. 3, Jan. 20, 1958, pp. 130-136.

In two years since oil was sold automatically, number of Lease Automatic Custody Transfer (LACT) units has snowballed. One certain company figures that it can install a LACT battery to run 300 barrels per day for $8,000; whereas, a conventional battery to handle the same amount of oil would cost $10,000.

131. McINTIRE, ROBERT L. Predicting Water Supply. Oil Gas Jour., vol. 56, No. 1, Jan. 6, 1958, p. 125.

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Electronic computer is responsible for calculating deficiency or spillage which results from any combination of reservoir capacity and annual rate of use. Nothing was accomplished on this computer that could not have been obtained by desk calculation methods. Major difference, however, was that for cost of less than $2,500 almost 8-1/2 months were saved.

132. McINTIRE, ROBERT L., AND RYAN, JOHN M. Computers Can Cut Pipeline Costs. Oil Gas Jour., vol. 56, No. 30, July 28, 1958, p. 185.

Presents method to lower cost of pipelines used to connect gas wells, gasoline plants, or nonoptimized connection points by use of computers.

M

133. MADDEN, P. R. Remote Control of Internal-Combustion-Engine Stations. Oil Gas Jour., vol. 56, No. 28, July 14, 1958, pp. 97-102.

Discusses a remote-controlled internal-combustion-engine station at Topeka, Kansas. Station is completely unattended matching operating procedure of motor-driven all-electric facilities. An operating-cost analysis indicated preferential use of the full-diesel type of engine over the all-electric facilities.

134. MAKARETZ, JOHN. Why Prestressed Concrete Cuts Costs. Petrol. Refiner, vol. 37, No. 9, September 1958, pp. 343-345.

Low initial cost, speed of construction, minimum maintenance, and good appearance are common reasons for using precast, prestressed linear concrete.

135. MANLY, C. G. Nuclear Power Future. Chem. Eng., vol. 65, No. 5, Mar. 10, 1958, pp. 133-138.

Reports that we have a promising future for nuclear power in 3 ways: (1) Economic nuclear power should be here by 1965; (2) uranium supplies are plentiful; and (3) reactor operating costs are down.

136. MARANCIK, J. V. Suggested Practices for Unit Layout. Petrol. Refiner, vol. 37, No. 9, September 1958, pp. 339-342.

Engineers are placing increasing emphasis on facilities for minimizing maintenance costs for refining units.

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137. MARSEE, JACK H. Economic Outlook for the Drilling Contractor. Petrol. Eng., vol. 30, No. 5, May 1958, pp. B-85 - B-94.

Future of entire drilling and production industry depends on ability of oilmen to cut drilling costs. Series of drilling cost graphs are also shown in article.

138. MATTIZA, D. S. Cost Factors for the Estimation of Piping and Electrical Work. Cost Eng., vol. 3, No. 1, January 1958, pp. 19-21.

Outlines cost factors for estimation of piping and electrical work.

139. MAYER, KARL M. The Market for Heat Reactors. Nucleonics, vol. 16, No. 2, February 1958, pp. 66-67.

Shows market analysis of heat consumed in 460 industries recognized by Census Bureau. Article has tables showing distribution in size of 11,841 boilers sold in United States between 1945 and 1957 and heat cost for 1,376 of the existing boilers.

140. MENETRIER, CLAUDE, AND RAYNAL, JEAN. What the French Learned About Turbodrilling at Lacq. Oil Gas Jour., vol. 56, No. 47, Nov. 24, 1958, pp. 64-68.

Final purpose of turbodrilling is to reduce hole cost. Cost examinations have been made on each of the 10-inch turbodrilled wells. Presents a cost comparison of turbodrilling versus rotary drilling for a 12-1/4-inch hole.

141. MERRYMAN, C. J., AND LAWRENCE, D. K. Pumping Costs Too High. Oil Gas Jour., vol. 56, No. 19, May 12, 1958, pp. 112-114.

Describes a systematic approach to cutting pumping costs down to size. This procedure is designed to aid tester in possibility of incomplete tests and to help bridge gap between beginner and seasoned dynamometer operator. No actual cost data presented in article.

142. MICHEL, ARTHUR E. Use of Models in Design and Construction. Chem. Eng. Prog., vol. 54, No. 3, March 1958, pp. 86-88.

When properly used by engineers, scale models will save money in design and operating costs. Michel mentions an annual savings of a quarter of a million dollars in drafting charges attributed, for the most part, to the use of models.

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143. MIDDLEBROOK, V. E. Plant Thermal Efficiency is Important in Any Cost-Cutting Program. Oil Gas Jour., vol. 56, No. 16, Apr. 21, 1958, pp. 127-129.

In any cost-cutting program plant thermal efficiency is important. Other items that will pay dividends for careful scouting are: Selection and rating of mechanical equipment, application of authentic controls, and increased recovery.

144. MILLER, E. B., JR. Rising Costs Can Be Curbed. World Oil, vol. 147, No. 1, July 1958, pp. 63-64.

Current recession is motivating industries other than oil to cut costs by streamlining their operations. Although no actual cost data were presented, article shows how rising costs in oil industry can be curbed.

145. MILLER, P. D., JR., HIBSHMAN, H. J., AND CONNELL, J. R. No Smoke, No Light, No Noise. Oil Gas Jour., vol. 56, No. 20, May 19, 1958, pp. 136-141.

A no smoke, no light, no noise flare, called mutijet, promises to be an economical solution to most flaring problems. A table showing typical flare costs also appears in article.

146. MONAHAN, REX. Much More Oil for Denver Basin. Oil Gas Jour., vol. 56, No. 13, Mar. 31, 1958, pp. 143-146.

Cost for drilling a "J" sand test is $18,000 for a depth of 5,500 feet in Denver (Colo.) basin. Figure includes location preparation and restoration, surface casing shoe and cement, 2 cores (total 70 feet), 2 drill-stem tests, core analysis, electric log, Micro Log, laterolog, and a geologist.

147. MOON, C. L. What's New and What Are the Trends in Pipeline Communication? Oil Gas Jour., vol. 56, No. 28, July 14, 1958, pp. 103-113.

Unit cost of typical microwave-radio relay communication system is approximately $2,000 per system-mile.

148. MULLOWNEY, J. F. Price Tags on Seven Methods of Removing CO_2 From High-CO_2-Content Gas. Oil Gas Jour., vol. 56, No. 6, Feb. 10, 1958, pp. 93-98.

Gives a series of diagrams and pictures of 7 methods of removing CO_2 from high-CO_2-content gas. Costs vary from 11 to 20 cents per thousand cubic feet gas treated.

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149. NAGEL, THEODORE. Dry Pipelining of Coal. Coal Age, vol. 63, No. 5, May 1958, p. 118.

Ability to reduce coal to minus 5 microns economically promises dry pipelining over land at costs as low as 1/2 cent per mile.

150. NELSON, W. L. Process Costimating. Oil Gas Jour.

This is a series of cost estimating articles appearing in the Oil and Gas Journal. They show current cost indexes for equipment, plants, and associated items.

Ref. No.	Title	Vol.	No.	Date	Page
150-1	Itemized Cost Indexes	56	1	Jan. 6, 1958	129
150-2	Is Rise in Cost of Refinery Construction Halted?	56	4	Jan. 27, 1958	273
150-3	Basic Refinery Operating Costs	56	8	Feb. 24, 1958	147
150-4	Nelson Operating Cost Index	56	9	Mar. 3, 1958	167-169
150-5	Fuel-Price and Cost at Average U.S. Refinery	56	11	Mar. 17, 1958	190-191
150-6	How Refinery-Operation Costs Have Risen	56	12	Mar. 24, 1958	211
150-7	Refinery Fuel Costs	56	13	Mar. 31, 1958	99
150-8	New Index Information: Pipeline Construction	56	14	Apr. 7, 1958	165-166
150-9	Royalties - or Research? Steam and Electrical Requirements	56	14	Apr. 7, 1958	170
150-10	Nelson Operating Cost Indexes (1956 = 100)	56	19	May 12, 1958	141
150-11	Since 1926 in Average U.S. Refineries	56	20	May 19, 1958	181
150-12	Cost of Electrical Power - Various Regions	56	21	May 26, 1958	114
150-13	Cost of Cooling-Tower Water	56	22	June 2, 1958	139
150-14	Water Costs - Makeup, Feed, Process, and Treated	56	24	June 16, 1958	125
150-15	Cost of Steam Varies Widely	56	25	June 23, 1958	137-138

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Ref. No.	Title	Vol.	No.	Date	Page
150-16	Average Cost of Refinery Steam Since 1932	56	26	June 30, 1958	103
150-17	Itemized Cost Indexes	56	27	July 7, 1958	143
150-18	Byproduct Electricity or Power?	56	28	July 14, 1958	131
150-19	Cost of Steam for Reciprocating Pumps	56	30	July 28, 1958	187
150-20	Cost of Refinery Power	56	32	Aug. 11, 1958	123
150-21	Efficiencies and Power Required in Estimating Pumping Costs	56	33	Aug. 18, 1958	221
150-22	Power and Cost of Gas Compression	56	34	Aug. 25, 1958	102
150-23	Air Compressor: Power Requirement and Cost	56	36	Sept. 8, 1958	126
150-24	Cost of Operating Topping Plants	56	38	Sept. 22, 1958	113
150-25	Itemized Cost Indexes	56	40	Oct. 6, 1958	217
150-26	Operating Labor in Processing Plant	56	40	Oct. 6, 1958	218
150-27	Cost of Refinery Power	56	42	Oct. 20, 1958	217
150-28	Atmospheric Rerunning and Steam Distillations	56	46	Nov. 17, 1958	187
150-29	More on Operating Costs	56	47	Nov. 24, 1958	89
150-30	Process Steam and Its Cost - Vacuum Distillation	56	48	Dec. 1, 1958	115
150-31	Cost of Injector Steam Can Be Large	56	49	Dec. 8, 1958	93
150-32	Cost of Operating Vacuum Flash Units	56	50	Dec. 15, 1958	108
150-33	Power for Distillation-Type Processes	56	52	Dec. 29, 1958	145

151. NELSON, W. L. Questions on Technology. Oil Gas Jour.

A series of technological questions and answers are discussed in the Oil and Gas Journal by W. L. Nelson.

Ref. No.	Title	Vol.	No.	Date	Page
151-1	Product Prices Throughout the World	56	2	Jan. 12, 1958	111-112
151-2	Cost of Refinery Chemicals	56	7	Feb. 17, 1958	126-127
151-3	Construction Cost Index for Pipelines	56	13	Mar. 31, 1958	102
151-4	Effect of Crude Gravity on Refinery Costs	56	16	Apr. 21, 1958	175
151-5	Relative Values of Crude Oils	56	21	May 20, 1958	117

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Ref. No.	Title	Vol.	No.	Date	Page
151-6	Cost of Fractionator Systems	56	23	June 9, 1958	133
151-7	Refinery Costs and Inflated Dollars	56	27	July 7, 1958	144
151-8	Steam Generation by Waste-Heat Boilers	56	29	July 21, 1958	108
151-9	Cost of Property Taxes and Insurance in Process Cost Estimates	56	31	Aug. 4, 1958	107
151-10	What Are "Large", "Average", and "Most Out of Date" Tankers?	56	35	Sept. 1, 1958	165
151-11	High-Sulfur-Fuel Corrosion	56	39	Sept. 29, 1958	62

152. NELSON, W. L. Refinery Construction Index. Oil Gas Jour.

A series of articles appearing monthly in Oil and Gas Journal. Included are cost indexes for pumps, compressors, etc., electrical machinery; internal combustion engines; instruments; heat exchangers; miscellaneous equipment average; materials component; labor component, and refinery construction.

Ref. No.	Vol.	No.	Date	Page
152-1	56	1	Jan. 6, 1958	105
152-2	56	5	Feb. 3, 1958	92
152-3	56	9	Mar. 5, 1958	100
152-4	56	14	Apr. 7, 1958	147
152-5	56	18	May 5, 1958	160
152-6	56	22	June 2, 1958	105
152-7	56	27	July 7, 1958	141
152-8	56	31	Aug. 4, 1958	85
152-9	56	35	Sept. 1, 1958	170
152-10	56	40	Oct. 6, 1958	216
152-11	56	44	Nov. 3, 1958	147
152-12	56	48	Dec. 1, 1958	130

153. NETZEBAND, W. F. Mining Methods and Costs at the Rialto Mine, Nellie B Division, American Zinc, Lead and Smelting Co., Ottawa County, Oklahoma. Bureau of Mines Inf. Circ. 7823, March 1958, 23 pp.

Contains graphs showing unit costs per ton of ore produced at Rialto mine in 1955, last year in which the mine was worked by American Zinc and Smelting Co.

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154. NIEDRACH, L. W., DEARING, B. E., AND SCHAFER, A. C. New Approach to Electrolytic U. Nucleonics, vol. 16, No. 1, January 1958, pp. 64-65.

Presents diagrams, graphs, and tables showing the method of continuous reduction of uranium by the electro-reduction of UO_3 directly to metal.

155. NORDEN, R. B. New Chemical Process Plates Resistant Nickel. Chem. Eng., vol. 65, No. 1, Jan. 13, 1958, pp. 172-176.

The Tube Reducing Corp., Wallington (N. J.) offers Niphos clad 1-1/2-inch extra heavy pipe at cost of about $1 per foot, compared with ordinary black pipe at $.50 per foot.

156. NUCLEONICS. A Low-Cost Heat Reactor. Vol. 16, No. 2, February 1958, p. 69.

Describes artist's conception of all-purpose low-pressure steam-generating unit designed to be competitive with conventional units operating at fuel costs of 65 cents per 10^6 B.t.u. or higher. This pressurized-water reactor produces 135,000 pounds per hour of 150 p.s.i.g. saturated steam. A table showing estimated capital costs for this low-cost heat reactor is presented.

157. _____. Heavy-Water Production and Use. Vol. 16, No. 9, September 1958, pp. 109-110.

Heavy water is being extracted from natural water at about $14 per pound D_2O when producing at full rate. Table showing analysis of operating costs is included.

158. _____. Shippingport Power Costs Sizing Up Uncertainties in Nuclear Fuel Costs. Vol. 16, No. 1, January 1958, pp. 50-53.

Of various factors that stand in way of economic nuclear power, nuclear fuel costs are single most important obstacle. Job of estimating total fuel cost for single standard reference design was broken down into 7 different aspects. They are:

1. Fissionable material
2. Fabrication
3. Reprocessing
4. Shipping spent fuel
5. Miscellaneous processing
6. Net plant efficiency
7. Irradiation level

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159. NUCLEONICS. Shippingport Power Costs - What Do They Mean? Vol. 16, No. 4, April 1958, pp. 60-61.

Inferred power costs such as a private firm would incur in producing electricity at Shippingport (Pa.). Detailed breakdown of Shippingport power costs show 64.4 mills per kilowatt-hour net.

160. _____. The Economic Situation as Viewed by the AEC. Vol. 16, No. 1, January 1958, pp. 48-49.

Report written by Nucleonics to W. Kenneth Davis, Director, Division of Reactor Development of the Atomic Energy Commission, concerning nuclear power costs.

O

161. OIL AND GAS JOURNAL. Catalyst Loss Cut. Vol. 56, No. 14, Apr. 7, 1958, p. 105.

Refiners with moving-bed cat crackers are cutting their catalyst replacement costs in half through a chemical and physical process which prevents rapid deterioration of catalyst beads through attrition.

162. _____. Does FPC Control Raise Gas Prices? Vol. 56, No. 10, Mar. 10, 1958, pp. 98-99.

Describes relationship between gas regulation and prices as discussed by Ralph E. Davis, a widely respected Houston gas consultant, in an interview with Joe Reilly, a Houston district editor of the Oil and Gas Journal.

163. _____. Drilling Cost--Price Squeeze Tightens. Vol. 56, No. 4, Jan. 27, 1958, pp. 130-131.

Shows that there was nothing strange for drillers in economic downturn experienced in 1957 by general economy. Contains a table showing how contractor's share of total well outlay dropped from 1935 to 1957.

164. _____. Faster Drilling Key to Cost Saving. Vol. 56, No. 45, Nov. 10, 1958, p. 114.

Cost of a foot of hole may come down in next few years based on move toward faster drilling rates, more portable new equipment, multiple completions, and automation on rig.

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165. OIL AND GAS JOURNAL. FPC Gets Transco Plan. Vol. 56, No. 14, Apr. 7, 1958, p. 108.

Pipeline expansion for offshore oil fields in Gulf of Mexico to cost $165 million. Article gives delivery capacities, suppliers, and other data.

166. _____. Gas, Oil Costing Motorist Less. Vol. 56, No. 11, Mar. 17, 1958, p. 85.

Operator of an automobile is paying less this year for gasoline and lubricating oil than last. Cost of gas and oil averages 2.39 cents a mile this year as compared to 2.42 cents last year.

167. _____. Here's a New Oil-Finding Tool...It's Aerial Color Photography. Vol. 56, No. 11, Mar. 17, 1958, pp. 122-124.

Baker Survey Co. can produce aerial colored photograph of a large area for about 3 cents per acre.

168. _____. How CO_2 is Removed by the Hot Potassium Carbonate Process. Vol. 56, No. 6, Feb. 10, 1958, pp. 98-99.

Graph presents cost of comparative investments required by processes for CO_2 removal using hot potassium carbonate, MEA, or water. Also shows treating cost comparison of different types of plants. Costs vary from $.73 per K_2CO_3 to $1.19 for water per thousand cubic feet of CO_2 removed.

169. _____. Industry Watching New Price Moves. Vol. 56, No. 6, Feb. 10, 1958, pp. 65-66.

Discusses production of crude-oil and cost structure in various areas.

170. _____. Lines Rejected Again. Vol. 56, No. 27, July 7, 1958, p. 84.

Mentions cost of crude-oil pipelines with a capacity of 500,000 barrels per day.

171. _____. More on SBA Acetylene. Vol. 56, No. 22, June 2, 1958, pp. 125-127.

Describes the SBA (Societe Belge de l' Azate) process for making high-purity acetylene by partial combustion of natural gas. Two tables showing direct operating costs and economics of process are included.

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172. OIL AND GAS JOURNAL. Pipeliners Learn Where to Cut Costs. Vol. 56, No. 14, Apr. 7, 1958, p. 124.

Contains information taken from cost-conscious pipeliners at their annual conference. Unofficial theme was how to capitalize on opportunities for economy.

173. _____. Portable Pumps Save Money. Vol. 56, No. 12, Mar. 24, 1958, p. 103.

Shell Oil Co. has come up with an idea for saving a large amount of money. Scheme is to make test pumping units more mobile. Each unit will save Shell about $2,000 a year in cost of moving alone.

174. _____. Radiation Cuts Rail Fuel Costs. Vol. 56, No. 14, Apr. 7, 1958, p. 109.

Use of irradiated low-grade fuel oil in locomotives is saving Denver and Rio Grande Western Railroad equivalent of 20 cents a share in stock.

175. _____. Refiners Didn't Cash in on Shortage. Vol. 56, No. 4, Jan. 27, 1958, pp. 200-203.

Reports how the American refiners gained little from boost in product sales during shortage period created by closing of Suez Canal. Also contains chart showing some representative crude prices from American refineries.

176. _____. Refiners Spending Millions in Fight Against Air Pollution. Vol. 56, No. 7, Feb. 17, 1958, pp. 88-94.

In past two years $46,000,000 has been spent on air-pollution controls. During 1958 an added $20,500,000 will be spent. In addition, industry is spending about $1,000,000 annually for research. Tables showing cost of air-pollution controls are included.

177. _____. Steel-Price Rise Starts Costing Oil. Vol. 56, No. 32, Aug. 11, 1958, pp. 65-66.

Oil industry is tasting steel-price increases, but tab will mount up to at least $48 million in extra costs in 1959.

178. OSPINA-RACINES, E. Want to Seek Oil in Columbia? Petrol. Eng., vol. 30, No. 2, February 1958, pp. E-3 - E-8.

Cost of wildcat drilling for oil in Venezuela is estimated from $50 to $100 per foot.

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179. PAGE, EDWARD C., JR. Equipment for Small-Scale Chlorination Plants. Part 1. Cost Eng., vol. 3, No. 1, January 1958, pp. 9-14.

Contains diagrams and tables concerning cost and operation of equipment for small-scale chlorination plants.

180. _____. Equipment for Small-Scale Chlorination Plants. Part 2. Cost Eng., vol. 3, No. 2, April 1958, pp. 55-59.

Presents typical flowsheet for wet process chlorination, a diagram of a chlorinator-absorber used for chlorination copper ingots, and table showing investment and operating costs for liquid phase chlorinations.

181. _____. Equipment for Small-Scale Chlorination Plants. Part 3. Cost Eng., vol. 3, No. 3, July 1958, pp. 85-91.

Explains the solid-gas and gas-gas chlorination processes for direct chlorination of metal oxides. Tables showing equipment, investment, and operating costs are included.

182. PATTON, JAMES L., GRUBB, G. C., AND STEPHENSON, K. F. Newest Acetylene Process - SBA - Kellogg. Petrol. Refiner, vol. 37, No. 11, November 1958, pp. 180-186.

Describes complete operating and economic data on newest commercial acetylene process developed by Societe Belge de L'Azote and the M. W. Kellogg Co. Cost information for manufacture of high purity acetylene from natural gas, naphtha or other liquid feedstocks is given.

183. PAUL, J. J., AND COX, J. R. G. Xenon - Poisoning Computer. Nucleonics, vol. 16, No. 5, May 1958, pp. 97-101.

Describes an Xenon-poisoning computer, a fission product with high thermal-neutron absorption cross section. This computer costs $16,000.

184. PERAZICH, GEORGE. Nuclear Heat for Paper Mills. Nucleonics, vol. 16, No. 2, February 1958, p. 68.

Paper and pulp industry appears to be a likely customer for nuclear process steam due to high cost of fuels presently used. According to census estimates, average price paid by pulp and paper mills in commercial fuels was close to 32 cents per 10^6 B.t.u.; whereas, present nuclear fuel cost is 30 cents per 10^6 B.t.u.

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185. PETROLEUM ENGINEER. Deeper Drilling Trend Seen in AAODC '57 Statistics. Vol. 30, No. 3, March 1958, pp. B-125 - B-126.

The 1957 drilling statistics compiled by American Association of Oilwell Drilling Contractors show drilling time rate has held steady, and contract cost dropped to $4.60 per foot - lowest in 10 years.

186. _____. Rising Cost. Vol. 30, No. 5, May 1958, pp. B-25 - B-27.

Rising cost of 1 field in 1 area is discussed, the Spivey oil field in South Central Kansas. Costs are same everywhere. Through pictures and graphs this article shows that costs are up on every item.

187. PORTER, E. W. Special Additives Cut Cement Costs. World Oil, vol. 146, No. 2, Feb. 1, 1958, pp. 63-68.

Density reduction, water loss, setting time control, and an accelerator are all being used by Phillips Petroleum Co. to reduce costs and provide more efficient cement jobs.

R

188. REED, PAUL, AND KINNEY, GENE T. Pipeline Contractors' Costs. Oil Gas Jour., vol. 56, No. 3, Jan. 20, 1958, pp. 105-120.

Contains series of charts, graphs, and pictures showing what's been happening to contractors' costs and contractors' prices, and how major equipment costs have risen in past five years in field of pipelining.

189. REED, R. M. Foaming Agents Lick Water-Zone Slowdowns. Oil Gas Jour., vol. 56, No. 22, June 2, 1958, pp. 97-101.

High cost of using foaming agents to lick water-zone slowdowns makes economy of technique appear questionable where large amounts of water are encountered, and lost circulation is not considered. As an example, while handling 50 to 60 barrels of water per hour, 6-1/2 gallons per hour of foaming agent were added at a cost of slightly over $5 per gallon.

190. REEDY, HAROLD J. How to Make Profit Below 15,000 Ft. Oil Gas Jour., vol. 56, No. 15, Apr. 14, 1958, pp. 166-171.

Cost of drilling and completing a well estimated at 15,950 feet at the Carter-Knox field in southern Oklahoma was $763,797. Cost of average well to drill and equip was estimated at $939,627.

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191. REYS, JOHN. Estimate Cost of Graphite Equipment. Vol. 65, No. 4, Feb. 24, 1958, pp. 137-142.

Costs of various types of equipment manufactured from impervious graphite are given.

192. RIGGS, R. J., SABIN, W. W., AND WOLF, C. J. Manganese - Gasoline Antiknock. Oil Gas Jour., vol. 56, No. 19, May 12, 1958, pp. 107-111.

New organometallic antiknock called AK-33X (methyl cyclopentadienyl manganese tricarbonyl) offers a means of improving octane quality without extensive capital investment and with cost effectiveness that will be competitive with many alternate means of octane improvement.

193. ROACH, MARSHALL L., AND SWANTON, WALTER F. Selection of Internals Important to Column Operations. Ind. Eng. Chem., vol. 50, No. 7, July 1958, pp. 57A-58A.

Explains why right choice of tower packing can make the difference between good, continuous performance and a sloppy, intermittent operation.

Operating costs are difficult to evaluate in analyzing bids for a column, but they actually affect the overall economics of process for which column is required.

194. ROBERTS, GEORGE, JR., AND GEFFEN, T. M. Fluid Injection for Oil Recovery. Oil Gas Jour., vol. 56, No. 34, Aug. 25, 1958, pp. 86-92.

The economics that could be realized by means of secondary recovery methods is discussed. Various methods that can be utilized are detailed.

195. ROBERTS, H. E. Trends in Power Generation - Lessons for Nuclear Engineers. Nucleonics, vol. 16, No. 7, July 1958, pp. 76-79.

Contains graphs, pictures, and tables showing cost of steam-electric power in advancing trend of nuclear power generation.

196. ROHRDANZ, R. C. Design for Low Construction Costs. Chem. Eng., vol. 65, No. 6, Mar. 24, 1958, pp. 133-137.

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Chemical engineers should be familiar with factors which affect chemical plant construction costs. They are: (1) Know types of contracts available; (2) know how contractor breaks down engineering information; (3) know how equipment is erected; and (4) know how to write specifications for contractor. By considering these points in process design, construction costs can be kept to a minimum.

197. ROWLAND, LESLIE ORR. What the Canadian Contractors Talked About...At Their Annual Meeting. Petrol. Eng., vol. 30, No. 4, April 1958, pp. D-32 - D-33.

Mentions amount of money invested by province of Saskatchewan in pipelines and production since 1950.

198. RUHLMAN, E. ROBERT. Phosphate Rock; Part 1. Mining, Beneficiation, and Marketing. Bureau of Mines Inf. Circ. 7814, Jan. 1958, 33 pp.

Average estimated cost of producing per long ton of marketable phosphate rock from various domestic fields is given in table.

S

199. SCHAHFER, R. M., STROUT, F. H., AND LAND, G. W. The Bonus-Penalty Method and Coal Purchasing. Coal Utilization, vol. 12, No. 6, June 1958, pp. 23-27.

Discusses a bonus-penalty method for correcting price to be paid for coal to adjust for receiving coal with poorer or better quality than that guaranteed in purchase contract. Results in constant net cost and rational basis for evaluation of competing coals.

200. SCHANZ, JOHN L, JR., AND BARWICK, ROBERT C. Economics of Refining in the Penn Grade Crude Area. Petrol. Eng., vol. 30, No. 2, February 1958, pp. C-23 - C-26.

Penn Grade refineries are facing problem of processing a high cost crude oil. Pennsylvania Grade crude oil from Bradford field was $4.65 per barrel in December 1957.

201. SCHUHMANN, ROBERT E. Series - Parallel Centrifugal Compressor Brings Flexibility. Petrol. Eng., vol. 30, No. 12, November 1958, pp. D-19 - D-23.

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Cost of installing a new centrifugal compressor that is basically two compressors in one case is less than cost of two separate units to do same job.

202. SCHUTT, H. C., AND MATTIOLI, A. R. Practical Planning is Vital When Designing Large Storage Capacity for Independent Producers. Oil Gas Jour., vol. 56, No. 34, Aug. 25, 1958, pp. 80-85.

Independent producer of ethylene, one which produces olefins from byproducts and sells them on demand, should have reserve supply equivalent to normal production during 4 stream days. Tables showing investment and operating costs of ethylene storage in aboveground and subsurface tanks are given.

203. _____. What's Involved in Ethylene Storage. Oil Gas Jour., vol. 56, No. 31, Aug. 4, 1958, pp. 74-79.

Storage for ethylene plant producing 200,000 pounds of ethylene per operating day from light hydrocarbon, ethane or propane, feed stock would cost $60,000.

204. SCUTT, E. D. Unusual Combustion Control System. Coal Utilization, vol. 12, No. 7, July 1958, pp. 31-35.

Predicted annual fuel cost for a steam-electric power generator operating at 80 percent load factor is $3.8 million.

205. SERVICE, W. J., PAYNE, R. E., AND ASKEY, W. E. Figure Cost of Getting Octanes. Petrol. Refiner, vol. 37, No. 4, April 1958, pp. 180-188.

Presents diagrams, graphs, and tables showing how refinery processes commercially available now will satisfy octane demand for next five years, but at greater cost.

206. _____. Gearing for Tomorrow's Octanes. Oil Gas Jour., vol. 56, No. 15, Apr. 14, 1958, pp. 90-98.

Presents diagrams, graphs, and tables showing that last increment of octane improvement costs as much to produce as it can demand at today's market prices.

207. SHATTO, H. L., AND HALL, A. H. Greater Rewards From LACT. Oil Gas Jour., vol. 56, No. 14, Apr. 7, 1958, pp. 133-139.

Shows cost of LACT installations for 50, 100, and 200 barrel units. Savings involved for such installations are also given.

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208. SMITH, ELBRIDGE M. Wet Dust-Collection Equipment. Cost Eng., vol. 3, No. 2, April 1958, pp. 49-54.

Contains graph and table showing equipment, operating, and installation costs of wet dust collectors.

209. SMITH, ENNIS C. Air-Cooled Heat Exchangers. Chem. Eng., vol. 65, No. 23, Nov. 17, 1958, pp. 144-150.

Discusses advantages of cooling with air instead of water and relates costs of air-cooled heat exchangers to size and type of unit.

210. SMITH, S. B. Economic Trends Affecting Energy Transportation. Coal Utilization, vol. 12, No. 11, November 1958, pp. 22-24.

Costs should be carefully investigated for each increment of generating capacity being considered in selection of new plant site. Rule-of-thumb distance of 300 miles as dividing point between energy and fuel transportation can be affected or changed by these economic factors.

211. SODAY, FRANK. The Research Age. Ind. Eng. Chem., vol. 50, No. 1, January 1958, pp. 133A-134A.

Statistics on cost of research are spectacular. In 1900 only few thousand dollars were spent annually; whereas, today we are spending $7,000,000,000.

212. SPEER, JOHN W. How to Get the Most Hole for Your Money. Oil Gas Jour., vol. 56, No. 13, Mar. 21, 1958, pp. 90-96.

Presents a report on how to get best performance and cheapest hole by using different methods of drilling techniques.

213. SPRACKLEN, S. B., AND HALVORSEN, K. G. Stream Analyzers Cut Ethylene Cost. Petrol. Refiner, vol. 37, No. 12, December 1958, pp. 115-118.

Stream analyzers cut ethylene cost, and with adequate instrumentation savings can be made. Contains ethylene process as example of instrumentation justification. Cost for instrumentation and required sampling handling system suggested for process would amount to approximately $70,000. Estimated cost savings for one year is in excess of $235,000 resulting in payout for instrumentation of less than 4 months.

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214. SPRINGER, FRED M. How Dispatchers Can Help Cut Operating Costs. Oil Gas Jour., vol. 56, No. 14, Apr. 7, 1958, pp. 140-147.

An efficient physical operation of pipeline system is dispatcher's primary responsibility, and an up-to-the-minute account of operations is indespensable to accomplishment of this purpose. By having efficient dispatcher, power costs, manpower costs, and leakage costs can be cut.

215. STOCKMAN, C. H., AND LYNN, R. E., JR. Equipment for Miniature Plants is Available. Ind. Eng. Chem., vol. 50, No. 4, April 1958, pp. 585-590.

Shows pictures of equipment available for miniature pilot plants, and costs of this equipment.

216. SWANSON, W. M., AND WATKINS, C. H. High Purity Aromatics - Bonus of Ethylene Process. Chem. Eng. Prog., vol. 54, No. 12, December 1958, pp. 56-59.

Estimated total erected cost of process equipment for producing ethylene by a variety of techniques involving pyrolysis, or cracking, of heavier hydrocarbon in presence of steam would be $2,270,000.

T

217. THORNTON, JAMES F. When to Contract for Pilot Plant Work. Ind. Eng. Chem., vol. 50, No. 8, Aug. 1958, pp. 58A-61A.

Prompt decision-making as to when to contract an outside firm for pilot plant work is hallmark of progressive company. On the contrary, indecision annually costs some companies many thousands of dollars. Unfortunate thing is that it need not be so. This article offers some thoughts as to what are basic considerations in making decisions on the "who" in pilot plant work.

218. TIELROOY, JACK. These Factors Affect Project Success. Petrol. Refiner, vol. 37, No. 6, June 1958, pp. 164-170.

Detailed cost factors are given which management must be aware of before making decisions on new projects. By carefully considering these factors, risk of new ventures in rapidly expanding chemical industry can be reduced.

219. TURNER, W. C. Why Prefab Insulation Cuts Costs. Petrol. Refiner, vol. 37, No. 1, January 1958, pp. 163-166.

Reports why prefabrication of insulation provides more economical and quicker installation of better quality.

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U

220. UHL, W. C., AND JUTERBOCK, E. E. Petroleum. Ind. Eng. Chem., vol. 50, No. 1, January 1958, pp. 44A-47A.

Future economics of aircraft fuels, motor fuels, and other major petroleum products are given.

V

221. VAUGHT, A. B., AND MURPHY, LOWELL, A. Slim Hole and Unique Completion Cut Well Costs Thirty-Six Percent. Petrol. Eng., vol. 30, No. 6, June 1958, pp. B-35 - B-37.

Total well costs of drilling and completing a 7,100 foot west Texas well were reduced some 36 percent by utilizing the benefits of slim-hole drilling and a unique permanent completion technique. Total cost incurred in drilling and completing this well was $52,835.54.

222. VENER, RAYMOND E. The Impact of Nuclear Energy On The Chemical Process Industries. Chem. Eng. Prog., vol. 54, No. 2, February 1958, pp. 57-62.

Pace of atomic energy developments over next several decades will be largely determined by extent and efficacy of Government subsidies.

W

223. WALTMAN, REID M., AND COX, TERRY F. Inverted Emulsion Mud Cuts Drilling Costs. Petrol. Eng., vol. 30, No. 9, August 1958, pp. B-42 - B-51.

Use of inverted emulsion drilling mud in four 3,500 foot wells has reduced drilling costs from $19,125 to $11,608 per well. Elimination of protective string when drilling through evaporites has resulted in much of savings.

224. WATSON, CLYDE D., HOIBERG, ARNOLD J., AND WEST, GEORGE A. Asphalt Lining of Radiochemical Waste Storage Basins. Ind. Eng. Chem., vol. 50, No. 8, August 1958, pp. 87A-91A.

Cost of constructing a 1,000,000 gallon lined earth basin for retention of radiochemical waste solution has been estimated to be $0.03 per gallon when sprayed lining or prefabricated asphalt plank is used. Cost includes excavation, grading, ditching, seeding, perimeter fence, lighting, liquid level indicator, and compaction, but it does not include roofing. When a roof is required, estimated cost would increase to $0.07 per gallon.

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225. WEAVER, JAMES B. Chemical Cost and Profitability Estimation - 1957. Ind. Eng. Chem., vol. 50, No. 5, May 1958, pp. 753-762.

This is the third in a series of annual reviews on chemical engineering economics. Includes discussion of effect of inflation, costs and sources of capital, evaluation of research by estimation, and engineering economy and operations research. Also includes an annotated bibliography, a subject index, and a critical discussion of published material.

226. _____, AND GREIST, WISHARD H. Size Your Plant for Growth--But How Much? Ind. Eng. Chem., vol. 50, No. 7, July 1958, pp. 59A-62A.

Presents graphs and tables showing how to maintain economic balance so as to help you decide how far up the forecast line to size your plant.

227. WEAVER, JAMES B., AND LYNDALL, FRANK S. 'Round the Clock or Weekends Off? Ind. Eng. Chem., vol. 50, No. 5, May 1958, pp. 61A-63A.

Gives graphs and tables showing that at times it is advantageous to use the 1-shift-per-day operation. Deciding factor is labor-variable dollars.

228. WEINBERGER, JACK. Data Processing System Cut PM Costs. Petrol. Refiner, vol. 37, No. 9, September 1958, pp. 335-338.

Update your preventive maintenance system by using new processing machines. These machines will result in lower unit cost for manufacturing product, better quality, and lower capital investment needs.

229. WEISS, W. A. Design Your Piping to Cut Maintenance Costs. Petrol. Refiner, vol. 37, No. 1, January 1958, pp. 141-146.

Shows that if more thought is given to pipe maintenance design, it will result in fewer and shorter costly shutdowns.

230. WEISS, W. J., GRAVES, R. H., AND HALL, W. L. A Fundamental Approach to Well Bore Stabilization. Petrol. Eng., vol. 30, No. 3, April 1958, pp. B-43 - B-60.

Shows a series of diagrams and graphs concerning costs of various mud systems.

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231. WORLD OIL. Contract Costs Plummet as Total Jumps. Vol. 146, No. 3, Feb. 15, 1958, p. 156.

Two categories of expenses involved in United States drilling costs tilted in 1957 more than ever before as the average contract cost per foot dropped to its lowest level since 1943, while the average total cost per foot climbed to its highest level in history.

U. S. Drilling Cost Trends

Year	Average Contract Cost/ft.	Avg. Total Cost/ft.	Year	Average Contract Cost/ft.	Avg. Total Cost/ft.
1941	$4.25	$ 7.25	1950	$5.00	$11.00
1942	4.00	7.50	1951	5.50	11.50
1943	4.50	8.00	1952	5.85	12.00
1944	4.75	8.25	1953	5.60	12.50
1945	5.00	9.00	1954	5.10	12.75
1946	5.00	9.50	1955	4.90	13.25
1947	5.00	10.25	1956	4.75	13.50
1948	4.75	10.75	1957	4.60	14.00
1949	4.75	10.75			

232. _____. Crude Oil Price Dip Slightly From 1957 Level. Vol. 146, No. 3, Feb. 15, 1958, p. 107.

Average United States price per barrel of crude was two cents less in January of 1958 than average of $3.10 in 1957.

233. _____. If Oil Could Speak. Vol. 146, No. 4, March 1958, p. 64.

On the average, a wildcat well costs $100,000, but some cost over $500,000. Since only one in nine wells strike oil, average oil man must invest $900,000 before he discovers a producing well. Compared to manufacturer, who does not build nine factories before he finds one that will produce goods for sale, an oil man spends nine times as much before he gets any production.

234. WRIGHT, R. L., AND KIRSOPP, D. E. Pond Surface Cooling for Chemical Plant Cooling Water. Chem. Eng. Prog., vol. 54, No. 2, February 1958, pp. 99-102.

Cost of construction of pond-surface cooling basins has been estimated to be one-third the amount required for purchase and erection of cooling towers calculated to produce similar results, assuming a land investment of $300 per acre.

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Y

235. YOUNG, W. E. Mining and Water-Control Methods at the Chief Lead-Zinc Mine, Chief Consolidated Mining Co., Juab County, Utah. Bureau of Mines Inf. Circ. 7828, May 1958, 21 pp.

Describes operations at Chief Consolidated Mining Co. in Juab County, Utah, where outstanding problem is water control; unique pumping methods employed are featured in report. Contains tables showing cost of water pumped per ton of ore mined.

Z

236. ZIEVERS, JAMES F., AND RILEY, CLAY W. Automation of Filtration Equipment. Chem. Eng. Prog., vol. 54, No. 7, July 1958, pp. 53-55.

Cost for automatic control of filtration equipment (exclusive of power-operated values but including solenoid actuators) for a single filter ranges in cost from $700 to $1,900. When filters are grouped for control, cost of control per unit is dropped considerably. An estimate of $200 is probably safe for cost of each additional filter over the base price in a group control system.

237. ZIMMERMAN, O. T., AND LAVINE, IRVIN. Power Shovels, Hoes, Cranes, Draglines, and Clamshells. Cost Eng., vol. 3, No. 3, July 1958, pp. 68-84.

Contains tables and graphs showing approximate cost and weight of power shovels, hoes, cranes, draglines, and clamshells.

238. _____. Powered Industrial Trucks. Cost Eng., vol. 3, No. 4, October 1958, pp. 109-121.

Gives cost information for various types of powered industrial trucks. Trucks are used for handling materials in many industrial plants.

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SUBJECT INDEX

Item

A

Agents, foaming 189
Air-pollution, research and cost. 176
American refiners:
  Crude prices 175
  Product sales following close of Suez Canal 175
Antiknock, organometallic 192
Aromatics, high-purity 216
Asphalt demand 103

B

Bibliography, cost data 60, 225
Blenders, horizontal ribbon-type batch 36
Boiler, carbon dioxide 6
Bucket teeth, cut costs 53
Burning coal, utility generating stations, costs 122

C

Cake thickness indicator 62
Calcium alginate capsule, production costs 42
Capital cost estimation 16
Carbon dioxide removal:
  From gas, costs 148
  From hot potassium carbonate, costs 168
  Operating costs 31, 32
Catalytic cracking feed 1
Cement, additives cut costs 187
Chemical engineering economics, review 225
Chemical plant cooling water, cost of pond-surface cooling basins.. 234
Chlorination plants, small-scale. 179
180, 181
Chrushing plant, cost of operation 75
Coal cutting, bit designs 124
Coal mining, cost control 51
Coal purchasing, bonus-penalty method 199
Coal-rail-power industrial development program 55
Combustion-air conditioning 64
Communication, pipeline 147
Compressor, centrifugal, cost 201
Compressor stations 71
Computer:
  Program 111
  Renting 44
  Use 132
  Xenon-poisoning 183
Concrete, prestressed..... 134
Continuous mixers 35
Corrosion control 76
Cost accounting 30
Cost estimating tool 18
Cost file 37
Cost-imating 150
Cost reduction budget 88
Cost trends, long-range evaluation 59
Costs:
  Analysis 107
  Capitalized method 105
  Control 50
  Crucial problem 57
  Factors 218
  Factors for piping and electrical work 138
  Indexes 23
  1957 cost literature 60
  Plant-construction 95
  Process unit operating, estimating 115
  Production in Venzuela 79
  Projects capital 89
  Reduction program 91
  Research 211
  Rising 144, 186

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Item

Crude-oil values 4
Crystallizers, cost 80

D

Data logger, automatic 9
Demethanization, separation step. 74
Drafting practices, better 73
Drilling, factor 129, 164
Drilling-mud industry, chemicals. 85

E

Economical benefits, planned and unplanned expansion 77
Ejector, cost 78
Electronic computer 131
Emulsion drilling mud 223
Energy transportation 210
Equipment:
  Cost economics 39
  Impervious graphite 191
  Miniature pilot plant 215
  Wet dust-collection 208
Equipment cost indexes 38
Estimate accuracy 84
Ethylene storage 202, 203
Exchangers, saving money 117

F

Filtration equipment, automation. 236
Fission products removal 112
Fixed capital projects, short-cut estimation 17
Fluid injection, recovery method. 194
Fractionating systems, cost of .. 28
Fracturing fluid, fresh water ... 102
Fuel, boron-type liquid 87
Fuel program, AEC 66
Furnace tubes, selection and cost 120
Future economy of coal in electric utilities industry 56

Item

G

Gas and oil, costing less 166
Gas regulation and prices 162
Gas turbines:
  Installation and operating costs. 8
  Pumping unit 125
Gasoline plant, cost of investment. 26
Granite, crushed 7

H

Haulage (transportation), dry crystal 45
Heat exchangers, air-cooled 209
Heat reactors:
  Low-pressure steam generating unit 156
  Market analysis 139
Heavy water, production, use 157
Hydraulic fracturing 100

I

Inflation 106
Insulation, prefabrication cuts costs 219

L

LACT units, costs 118, 130, 207
Lining technique 68

M

Maintenance costs 10
Material handling, cost 237
Mine cars, new 54
Mine, Stormy Day Tungsten 109
Mud storage 61
Mutijet, flare 145

N

Nuclear energy:
  Continuous reduction of uranium.. 154
  Development of nuclear reactors.. 58, 98, 108
  Economic outlook 123, 135, 159
  Government subsidies 222

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	Item
Nuclear fuel cost	158
Replacement for electrical power	197
Nuclear heat for paper mills	184
New product, cost of designing	81
Nomograph, estimates	93
O	
Octanes, cost to produce	205, 206
Offshore pipelines, cost	119
Oil:	
Cost of crude	200, 232
Economic downturn from 1935 to 1957	163
Industrial preview for 1958	3
Producing, cost	101
Oil base mud, costs	11
Oil heater, cost of direct-fired.	83
Oilmen, economic outlook	137
Oilwell drilling:	
Cost	2, 146, 178, 185, 190, 230
Cost investments	233
Cost reducing	161
Cost trends	231
Different drilling techniques	212
Oilwell fracturing, cost of	63, 126
Operation, one-shift-per-day	227
Optimum design capacity	47
Oxidation, two-stage contacting system	41
P	
Pentane splitter	5
Perchloroethylene, development of a process	127
Permeation, to separate mixtures	22
Pesticides, putting new one on market, cost	97
Petrochemical production, cost of raw materials	121
Petroleum products, future economics	220
Pharmaceuticals, effect of continued production on manufacturing costs	15
Phosphate rock	198
Photography:	
Aerial, cost of producing	167
Field	92
Pilot plant work, contracting	217
Pipe:	
Extra-heavy, cost	155
Maintenance design	229
Piping material, cost	49
Pipeline gas, conversion from coal	114
Pipeliners, cost-conscious	172
Pipelines:	
Building	170
Costs	90, 188
Dispatcher	214
Expansion costs	165
Protection of bare pipelines	33
Pipelining, dry	149
Plant construction, cost factors	196
Plant sizing	226
Plant thermal efficiency	143
Plastic-metal putty, minimize shutdowns	43
Portable test pumps, cost of moving	173
Power costs, Shippingport	160
Power generator, steam-electric, fuel cost	204
Power, steam-electric	195
Pressure leaf filter	86
Process:	
Acetylene-SBA	171, 182
Flash oxidation	40
Gas-gas chlorination	181
Hot-carbonate, cost	72
Hot potassium carbonate	31
Solid-gas chlorination, cost	181
Process evaluation, lab to plant	29
Process plant, automation	20
Processing machines, lower costs	228
Pumps:	
Costs	141
Gas turbine units	125
Maintenance	67
Pump stations, electric and diesel	34
R	
Radiation:	
Cuts fuel costs	174
Non-chain reactions	94
Radiochemical waste storage basin, lining, cost	224

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Item	
Ratio estimating	12
Reactors, continuous-processed, fuel cost	113
Reclamation system, cost and savings	104
Refinery construction index	152
Refinery estimate, cost	19
Rialto mine, methods and costs	153
S	
Saline water conversion	48
Salt water disposal, maintenance costs	65
Scale models, use in design and construction	142
Shaft-sinking:	
Costs	52, 110
Methods	110
Sludge-handling costs	128
Sour crude oil, reduction in price	169
Station:	
Compressor, costs	27
Internal-combustion engine	133
Steam, methods of calculating unit costs	116
Steel price rise	177
Stream analyzers	213
Suspended work cage	24
System:	
Cost	69
Solvent recovery	14
T	
Technological questions and answers	151
Tipple dust control	99
Tower packing	193
Trucks, powered industrial, cost	238
Tubing, workover costs	82
Turbodrilling	140
U	
Unifiner, cost to operate	13
Unit layout	136
Uranium tetrafluoride	96
W	
Water-control methods	235
Water distillation, cost of saline	46
Water reservoir, cost of saving water	70
Well costs	221
Well, input, plugging	25
Well workovers	21

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AUTHOR INDEX

Item

A

Abbott, M. D., Archibald, R. C., and Dorn, R. W. 1
Adams, Ernestine 2, 3
Adams, Nellson R., and Kersten, Ralph C. 4
Albright, Melvin A. 5
Alexander, W. H., and Bradley, R. L. 6
Alfred, Robert, and Schroeder, H. L. 7
Apitz, C. R. 8
Archibald, R. C. See Abbott, M. D.
Arendt, John J., and Savoy, John . 9
Askey, W. E. See Service, W. J.
Atkins, George T., and Felps, Newton O. 10
Atkinson, J. E., and Baker, G. G. 11
Aven, Russell E. See Kasten, Paul R.

B

Bach, Norman G. 12
Baker, G. G. See Atkinson, J. E.
Baral, W. J., Hendricks, G. E. W., and Damskey, L. R. 13
Barnebey, H. L., and Davis, W. L. 14
Bartels, Charles R. 15
Barwick, Robert C. See Schanz, John L., Jr.
Bauman, H. Carl 16, 17, 18
Bean, Theron W. 19
Bechtold, Ira C. 20
Bethancourt, Raoul 21
Binning, Robert C., and James, Frank E. 22
Birchard, Ralph 23
Bolles, W. L. See Fair, J. R.
Bolmer, R. L., and Greenlee, B. B. 24
Botset, Dr. Holbrook G., and Fulton, Paul R. 25
Bradley, R. L. See Alexander, W. H.

Item

Brady, B. T., and Rorschach, R. L. 26
Brennan, John E. See Kallman, Donald
Bromberg, Irwin 27, 28
Buchanan, R. L. 29
Buchtler, Harold R., and Dunn, James F., Jr. 30
Buck, B. O., and Leitch, Angus R. S. 31, 32
Bullock, Robert L. 33
Burington, Artha Jean See Hollister, Hal L.

C

Callahan, J. L. 34
Carlson, G. Arnold 35, 36
Chemical Engineering 37, 38, 39, 40, 41 42, 43, 44, 45
Chemical Engineering Progress 46, 47, 48
Christopher, Dan 49
Coal Age 50, 51, 52, 53, 54
Coal Utilization 55, 56, 57
Cohen, Karl 58
Connell, J. R. See Miller, P. D., Jr.
Copulsky, William, and Cziner, Rudolf 59
Cost Engineering 60
Cox, J. R. G. See Paul, J. J.
Cox, John, and Scott, Robert W. ... 61
Cox, Terry F. See Waltman, Reid M.
Cronan, C. S. 62, 63
Crooks, W. R. 64
Cunningham, B. G. 65
Cziner, Rudolf See Copulsky, William

Generated on 2024-09-22 00:22 GMT / https://hdl.handle.net/2027/osu.32435030643399
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Item

D

Dalzell, R. Carson, Davis, W. Kenneth, Goodman, Clark, and Staebler, Ulysses M. 66
Damskey, L. R. See Baral, W. J.
Davis, W. Kenneth See Dalzell, R. Carson
Davis, W. L. See Barnebey, H. L.
Dearing, B. E. See Niedrach, L. W.
Decker, Arthur L. 67
Dedert, W. G. See Florine, R. E.
DeLorenzo, J. F. 68
Dershowitz, A. F., and McEntee, H. R. 69
Dorn, R. W. See Abbott, M. D.
Dressler, Russell G., and Johanson, Arnold G. 70
Dunn, James F., Jr. See Buchtler, Harold R.

E

Eaton, J. B. 71
Eickmeyer, A. G. 72
Enquist, Melvin See McCord, H. B.
Evans, Frank 73
Evans, R. B. III See Howard, George C.

F

Fair, J. R., Bolles, W. L., and Nisbet, W. R. 74
Fast, C. R. See Howard, George C.
Fattu, Emil 75
Felps, Newton O. See Atkins, George T.
Flickinger, Don H. See Howard, George C.
Fink, Frederick W. 76
Florine, R. E., and Dedert, W. G. 77
Fondrk, V. V. 78
Franklin, Harry L., and Miller, W. Doyle 79
Fulton, Paul F. See Botset, Dr. Holbrook G.

Item

G

Garrett, Donald E., and Rosenbaum, Gerhard P. 80
Geffen, T. M. See Roberts, George, Jr.
Gilfoil, W. S., and Mongan, E. L. 81
Goeken, R. J. 82
Goodman, Clark. See Dalzell, R. Carson
Gordon, J. A. 83
Gore, W. L. 84
Graves, R. H. See Weiss, W. J.
Gray, Dr. George R. 85
Greenlee, B. B. See Bolmer, R. L.
Greist, Wishard H. See Weaver, James B.
Grimm, Richard T. 86
Grubb, G. C. See Patton, James L.
Guthrie, Virgil B. 87
Gutoff, Reuben 88

H

Hackney, John W. 89
Hall, A. H. See Shatto, H. L.
Hall, W. L. See Weiss, W. J.
Halsell, Grace 90
Halvorsen, K. G. See Spracklen, S. B.
Hamilton, Benjamin P., Jr. 91
Hammond, G. P., and Kinstler, R. C. 92
Hancher, C. W. See Higgins, I. R.
Hand, W. E. 93
Hardwick, T. J., and Nejak, R. P. 94
Hardy, Walter L. 95
Hendricks, G. E. W. See Baral, W. J.
Hibshman, H. J. See Miller, P. D., Jr.
Higgins, I. R., Roberts, J. T., Hancher, C. W., and Marinsky, J. A. 96
Hitchner, L. S. 97
Hoiberg, Arnold J. See Watson, Clyde D.

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Item

Hollister, Hal L., and Burington, Artha Jean 98
Hopkins, A. S. J. 99
Howard, George C., Flickinger, Don H., Fast, C. R., and Evans, R. B. III 100
Huber, T. A. 101
Hurst, R. E., Rollins, J. T., and Stewart, H. A. 102

J

James, Frank E. See Binning, Robert C.
Jason, Herbert O. 103
Jeffus, D. M., Jr., and Jones, V. T., Jr. 104
Jelen, F. C. 105, 106, 107
Jenkins, George F. 108
Johanson, Arnold G. See Dressler, Russell G.
Johnson, A. C. 109, 110
Jones, H. E., and Kjellmark, E. W., Jr. 111
Jones, V. T., Jr. See Jeffus, D. M., Jr.
Joyce, Thomas J. See Katell, Sidney
Juterbock, E. E. See Uhl, W. C.

K

Kallman, Donald, and Brennan, John E. 112
Kasten, Paul R., and Aven, Russell E. 113
Katell, Sidney 114
_____, and Joyce, Thomas J. 115, 116
Kern, Donald Q., and Seaton, Ralph E. 117
Kersten, Ralph C. See Adams, Nellson R.
Kinney, Gene T. 118
See also Reed, Paul
Kinney, Gene T., and Resen, Larry 119
Kinstler, R. C. See Hammond, G. P.

Item

Kirsopp, D. E. See Wright, R. L.
Kjellmark, E. W., Jr. See Jones H. E.
Krebs, Thomas M. 120
Kuhn, W. E. 121

L

Lammers, H. B. 122
Land, G. W. See Schahfer, R. M.
Lane, James A. 123
Lavine, Irvin See Zimmerman, O. T.
Lawrence, D. K. See Merryman, C. J.
Leighton, J. C. 124
Leitch, Angus R. S. See Buck, B. O.
Locher, W. E., Olson, A. E., and Nibley, P. P. 125
Locker, George R. 126
Lukes, James J. 127
Lyndall, Frank S. See Weaver, James B.
Lynn, R. E., Jr. See Stockman, C. H.

Mc

McCord, H. B., and Enquist, Melvin 128
McEntee, H. R. See Dershowitz, A. F.
McGhee, Ed 129, 130
McIntire, Robert L. 131
_____, and Ryan, John M. 132

M

Madden, P. R. 133
Makaretz, John 134
Manly, C. G. 135
Marancik, J. V. 136
Marinsky, J. A. See Higgins, I. R.
Marsee, Jack H. 137
Mattioli, A. R. See Schutt, H. C.
Mattiza, D. S. 138

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Item

Mayer, Karl M. 139
Menetrier, Claude, and Raynal, Jean 140
Merryman, C. J., and Lawrence, D. K. 141
Michel, Arthur E. 142
Middlebrook, V. E. 143
Miller, E. B., Jr. 144
Miller, P. D., Jr. Hibshman, H. J., and Connell, J. R. 145
Miller, W. Doyle See Franklin, Harry L.
Monahan, Rex 146
Mongan, E. L. See Gilfoil, W. S.
Moon, C. L. 147
Mullowney, J. F. 148
Murphy, Lowell A. See Vaught, A. B.

N

Nagel, Theodore 149
Nejak, R. P. See Hardwick, T. J.
Nelson, W. L. 150, 151, 152
Netzeband, W. F. 153
Nibley, P. P. See Locher, W. E.
Niedrach, L. W., Dearing, B. E., and Schafer, A. C. 154
Nisbet, W. R. See Fair, J. R.
Norden, R. B. 155
Nucleonics 156, 157, 158, 159, 160

O

Oil and Gas Journal 161-177
Olson, A. E. See Locher, W. E.
Ospina-Racines, E. 178

P

Page, Edward C., Jr. ... 179, 180, 181
Patton, James L., Grubb, G. C., and Stephenson, K. F. 182
Paul, J. J., and Cox, J. R. G. . 183
Payne, R. E. See Service, W. J.

Item

Perazich, George 184
Petroleum Engineer 185, 186
Porter, E. W. 187

R

Raynal, Jean See Menetrier, Claude
Reed, Paul, and Kinney, Gene T. .. 188
Reed, R. M. 189
Reedy, Harold J. 190
Resen, Larry See Kinney, Gene T.
Reys, John 191
Riggs, R. J., Sabin, W. W., and Wolf, C. J. 192
Riley, Clay W. See Zievers, James F.
Roach, Marshall L., and Swanton, Walter F. 193
Roberts, George, Jr., and Geffen, T. M. 194
Roberts, H. E. 195
Roberts, J. T. See Higgins, I. R.
Rohrdanz, R. C. 196
Rollins, J. T. See Hurst, R. E.
Rorschach, R. L. See Brady, B. T.
Rosenbaum, Gerhard P. See Garrett, Donald E.
Rowland, Leslie Orr 197
Ruhlman, E. Robert 198
Ryan, John M. See McIntire, Robert L.

S

Sabin, W. W. See Riggs, R. J.
Savoy, John See Arendt, John J.
Schafer, A. C. See Niedrach, L. W.
Schahfer, R. M., Strout, F. H., and Land, G. W. 199
Schanz, John L., Jr., and Barwick, Robert C. 200
Schroeder, H. L. See Alfred, Robert
Schuhmann, Robert E. 201

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Item

Schutt, H. C., and Mattioli, A. R. 202, 203
Scott, Robert W. See Cox, John
Scutt, E. D. 204
Seaton, Ralph E. See Kern, Donald Q.
Service, W. J., Payne, R. E., and Askey, W. E. 205, 206
Shatto, H. L., and Hall, A. H. ... 207
Smith, Elbridge M. 208
Smith, Ennis C..... 209
Smith, S. B. 210
Soday, Frank 211
Speer, John W. 212
Spracklen, S. B., and Halvorsen, K. G. 213
Springer, Fred M. 214
Staebler, Ulysses M. See Dalzell, R. Carson
Stephenson, K. F. See Patton, James L.
Stewart, H. A. See Hurst, R. E.
Stockman, C. H., and Lynn, R. E., Jr. 215
Strout, F. H. See Schahfer, R. M.
Swanson, W. M., and Watkins, C. H. 216
Swanton, Walter F. See Roach, Marshall L.

T

Thornton, James F. 217
Tielrooy, Jack 218
Turner, W. C. 219

U

Uhl, W. C., and Juterbock, E. E. 220

V

Vaught, A. B., and Murphy, Lowell A. 221
Vener, Raymond E. 222

Item

W

Waltman, Reid M., and Cox, Terry F. 223
Watkins, C. H. See Swanson, W. M.
Watson, Clyde D., Hoiberg, Arnold J., and West, George A. .. 224
Weaver, James B. 225
_____, and Greist, Wishard H. ... 226
Weaver, James B., and Lyndall, Frank S. 227
Weinberger, Jack 228
Weiss, W. A. 229
Weiss, W. J., Graves, R. H., and Hall, W. L. 230
West, George A. See Watson, Clyde D.
Wolf, C. J. See Riggs, R. J.
World Oil 231, 232, 233
Wright, R. L., and Kirsopp, D. E. 234

Y

Young, W. E. 235

Z

Zievers, James F., and Riley, Clay W. 236
Zimmerman, O. T., and Lavine, Irvin 237, 238

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